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Political Affairs

Fictionalized Report on First Anniversary of Chernobyl Accident — Part 2

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CONTENTS

FICTIONALIZED REPORT ON FIRST ANNIVERSARY OF CHERNOBYL ACCIDENT - Part 2

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View of Kiev

[Text] The hot month of May 1986 put its own new imprint on Kiev: the city that was clean even without this was washed and licked clean to an incomprehensible degree in those days. Uninterruptedly, for entire days on end, sprinkler trucks travelled through the city, wiggling their watery whiskers and washing the radioactive dust from the asphalt. Wet rags lay everywhere at the doors to houses, institutions, stores and even churches, and the endless wiping of footwear became a de rigeur indication of good tone. The city's streets remained full of people as before, but if you looked closely you would notice that the number of children in Kiev had decreased greatly — during the first days of May the city took to moving its children out in any way possible — organized and not organized, by train, airplane, bus and Zhiguli. Large columns of automobiles with belongings on the roofs moved to the west, south and east. Parents were driving, taking their children and grandfathers and grandmothers out, going to stay with relatives and acquaintances; many were going wherever the road led, just to get as far away as possible from the radiation.

During those days reports emphasized that Kiev and Kiev Oblast were living a normal life. Yes, people did not flinch before misfortune, people struggled with the accident and its consequences, and the external appearance of the city changed very little. The internal, the most tenacious essence of life, was preserved, for enterprises, the means of transportation, stores, institutes and institutions operated normally, communications functioned (with brief interruptions, it is true), and the newspaper continued to be published.

...During those days it seemed that never before had there been so many beautiful girls in the city, that never before in Kiev's history had spring been so enchanting. I will never forget how, returning from Chernobyl, I came into Kiev just as dusk was settling over the city. Everything was so familiar—the silhouette of the uncompleted skyscraper hotel was darkening above the Levoberezhaya metro station. Across the way, at the taxi stand, the roofs of automobiles were glistening like a school of variegated fish flattening themselves to sandy bottoms for the night. The metro rushed headlong toward the bridge in order to plunge into the thickness of the Kiev hills and and to rumble to the Kreshchatik. Under the metro bridge the Dnepr was bursting from high water, its expanse disappearing into the darkness was Gogolian in immensity and pathos. Lovers were kissing on the embankment, and tired people were returning to their homes—and all of these simple pictures of life in this city of many millions, which usually did not touch us, suddenly shook me to the depths of my soul as if I had gathered insight and understanding into some very important change that had occurred in my consciusness during the last several days. This peaceful evening seemed to me to be piercingly beautiful, as if I were parting forever with springtime, with the city and with life itself, strangers became dear to me and the everyday life of Kiev appeared to me in a new light.

I felt this in the alarming light of the accident, which occurred quite close—just two hours drive by car—during the days when the feeling of danger was heightened to the limit. Later this passed.

The Dnepr, the hills, the houses and the people—all of the commonplace seemed at that time to me unusual, as if it had come off the screen of a science-fiction movie. Especially often during those days I remembered Stanley Kramer's film, "On the Beach," which told the story of Austrailia as it waited, doomed, for the arrival of the radiation cloud after the third and final atomic war in the history of mankind. The strange and unrealistic aspect of the film seemed to be that during this critical situation people continued to live as before, without changing their habits, maintaining their outward calm and existing as if by inertia. It turned out that this was true to life. For Kiev's population the old habits remained.

However, the patriarchal, ancient city with the gold cupolas of its cathedrals preserving the memory of the ages was transformed inscrutably during something like half a month, becoming lastingly connected with the image of the new atomic age. From a ringing metaphor repeated by us in vain before the accident, this phrase ("atomic age") was transformed into harsh reality—the words "dosimetry control," "radiation," "decontamination," all of these "milliroentgens," "roentgen equivalents," "rads" and such has firmly entered the vocabulary of Kiev's population, and the figure of a man in a gown with a respirator on his face and a Geiger counter in his hands being glimpsed fleetingly everywhere, has become customary, just like the crowd of automobiles at the entrance points to Kiev—the dosimetric control of automobiles has been instituted at all KP [Check points].

Milk and milk products have disappeared from Kiev markets and counters, and it is forbidden to sell lettuce, sorrel and spinach. Other gifts of the Ukrainian soil — radishes and strawberries, early potatoes and onions — were subject to dosimetric control. "God willing, this does not have radiation," chanted the peasants on Bessarabka, selling strawberries for fabulously low prices. But few people bought.

And as always happens, the childred began to copy the incomprehensible life of adults. On Rusanovka I saw children running through the bushes with sticks in their

hands, as if measuring the area with a dosimeter. They were playing radiation. And one little girl wrapped in a sheet walked around at the entrance to her house, making "frightening" eyes and saying in a sepulchral voice: "Ooo-ooo, I am radiation, everyone hide from me. I am evil and terrible..."

"In Kiev there is a business-like and working atmosphere," assured the newspapers, radio and television, and this was the truth. Ancient Kiev maintained its face and dignity before itself, before our country and before the entire world — this was emphasized repeatedly with astonishment and respect by guests to the capital of the Ukraine.

This is so.

But during those days another Kiev also existed, hidden from outside glances, one that did not attract the attention of newspapers and television, and not mentioning it now would mean hiding a part of the truth and distorting the complicated manner of events. It was a city with excited crowds at the ticket counters of the railroad stations and Aeroflot. There were some days when even those with tickets had difficulty in reaching the train station — the police had to intervene. Eight to ten people travelled in compartments meant for four; speculators asked up to 100 rubles for tickets to Moscow that normally sold for 15 rubles. At that time I was touched nearly to tears, even though I am not a very emotional person, by Yevgeniy Lvovich Iyerusalimskiy, candidate of medical sciences and senior scientific worker of the Kiev Institute of Problems in Oncology, an individual whom we met just 3 days before all of this happened. He came to me and offered me a ticket to Moscow for my daughter. And although the ticket was not needed, during those days that kind of offer was the sign of a most faithful friendship...During those days, like during the war, a number of customary notions changed instantaneously. Eternal concepts such as faithfulness, decency and duty acquired a special significance and value. That May in many Kiev apartments telephone calls were received from different cities of the Soviet Union. Friends, relatives and acquaintances called, inviting people to visit. But there were others who did not call although, it would seem, according to all pre-Chernobyl rules of friendship they should have done so.

For a long time — an entire month — I waited for a telephone call from Moscow from a certain individual whom I had considered a true friend, and who often had stayed with me in the past. I never did receive that call...But then quite unexpectedly the Armenian writer Gevorg Mikhaylovich Agadzhanyan, who lived in Azerbaijan, and whom I had met in Kiev by accident just once in my life, called me from Baku and suggested that I send my daughter to him for the summer...

We had to become acquainted with many strange and unexpected things during those days. What do you think, why did lines form at the department store in early May? To buy Finnish suits, West German Salamander shoes or Yugoslavian leather jackets? No. To buy suitcases and bags.

During those days Kiev apartments were literally abuzz with conversations and rumors, arguments and discussions, conjecture and facts. Decisions were made and immediately rescinded, phantastic plans were presented, and anecdotes and phantastic tales were told. Persistenty tales circulated in the city about black "Volgas," driving up to the train platforms, about long lines for airplane tickets at counters located in some of the more prominent of the capital's buildings...

Yes, there was no panic in Kiev. But there was enormous alarm concerning the health of both children and adults and it was worthwhile to heed this anxiety as well.

Everyone remembers the photographs of the destroyed reactor that were spread all over our newspapers. Even people who understood nothing about atomic energy were shocked by the unnatural appearance of the reactor. To specialists it was clear that something unprecedented in scale had occurred. The first emissions travelled northwest and west. On 30 April the wind changed direction and began to blow towards Kiev. Radioactive particles were carried toward the city with its multimillion population. I remember that day distinctly — I was at the Ukrainian Ministry of Health. I remember that the worry and tension among doctors grew and that in ministry offices and hallways there was talk about taking extreme preventative measures. Proposals were made to turn to the population with a special call concerning precautionary measures. But until 6 May no one heeded these proposals.

Many, very many now blame the doctors. Why didn't they warn us? Why didn't they step in sooner? I do not want to shield my colleagues —there are many sins on their consciences too. But for the sake of fairness I would like to emphasize that it is not the doctors who are in charge of the channels of mass information. And it is not the doctors who make the most important decisions. And decisions were essential. Already in late April serious thought should have been given to the expediency of carrying out festive Mayday ceremonies in Kiev and regions neighboring on the zone, especially with the participation in them of children. I am sure that the love of the Soviet people for the May 1 holiday and their patriotic feelings would in no way have been diminished as a result of the cancellation of the festivities. I was told about the instance in which one of the first postwar May 1 celebrations was cancelled in Belorussia...due to rain. And what happened? Similarly, in 1986 the people would have understood correctly the necessity for emergency measures and for the temporary absence of children from the streets. The people would have been grateful, because the photographs of the damaged reactor and of smiling children with flowers standing in festive columns does not bear comparison. Wasn't it possible during those holidays to ask the people who filled the parks,

beaches and nearby forests, who went to their dachas, to abstain temporarily from these joys of spring? The people would have understood.

Some might object that radiation levels in Kiev did not exceed acceptable levels so why, as they say, guard the garden? But there are also acceptable levels of alarm and anxiety which during those days exceeded all conceivable levels.

We should not have, and it was incorrect of us, to ignore the fear borne of radiation and to combat it either with silence or with bravely optimistic declarations. After all, in the course of dozens of years newspapers, radio, television and popular scientific journals themselves gave rise to, taught us, this fear by describing the horrors of atomic warfare and all its somatic (physical) and genetic consequences. And although the scale of the Chernobyl accident and an atomic explosion simply cannot be compared, nevertheless the fear of radiation was quite strong. It would have been possible to decrease it, to soften the psychological consequences of the accident, with a quick announcement of preventative measures—but not on May 6 but earlier. As the proverb says, "God helps those who help themselves."

During those days I wrote, and can repeat today with even greater harshness and certainty, that one of the most severe lessons of the first month (and subsequent months as well) of the "Chernobyl era" was taught to our means of mass information, which were not able to restructure their work in the spirit of the decisions of the 27th party congress. The impetuous course of events sharply curtailed the time needed for bestirring themselves, for various types of coordination and agreements. I recalled several difficult days in our lives, from 26 April to 6 May, when the shortage of domestic information was evident while foreign radio stations had free scope on our airways, literally tormenting those individuals who had rushed to their radios. Let's not soften things for ourselves with lies — there were many people who did this because nature abhors a vacuum, including an informational vaccuum. This brought about not only ideological but also medical damage as well. Now it is already difficult to estimate how many people were seriously stressed that day as a result of the ignorance and fear for the lives of their children and close ones and for their health.

There appeared in Kiev both "augurs of disaster," disseminating all types of false rumors that encouraged panic, as well as the hale and hearty "optimists" who repeated only one thing over and over again: "Everything is fine, excellent canopy." Within the city in the May heat it was possible to chance upon strange-looking figures wrapped up head to foot in old clothes, in overcoats, in hats or scarves covering almost half their faces, in gloves and socks...These were the "augurs of disaster," mobilizing every means of individual protection. I do not judge them, but after the Zone and all its problems all Kievan fears seemed simply ridiculous.

After the first days of silence when information was extremely sparse, numerous articles appeared in newspapers, and television began to broadcast the appearances of specialists. But...

A number of publications and television broadcasts were characterized by a falsely-cheerful, hat waving atmosphere, as if the discussion was not about a great human tragedy, not about one of the somber events of the 20th century, but about a school fire drill or competition among firefighters using dummies...

The habit of working according to old schemes inherited from the time of general indifference had its effect; the desire to present only lulling,peaceful and joyful information had its effect; the fear of increasing glasnost as regards the most ticklish and uncomfortable questions, one of which was Chernobyl, also had its effect. Of course it would be unfair not to note the innovations that appeared during those days in the work of the organs of mass information. Let us at least look at the interesting experience of Ukrainian television—beginning in May the editors and technicians of the popular information program, "Aktualnaya kamera" [Topical Camera], people who were not only talented but brave as well (you will agree that it is not simple to film in the Zone, under fire by radiation), acquainted the Ukraine's television viewers with the events surrounding the AES [Atomic electric power plant].

But all of this was later.

Between 3 May and 6 May dark rumors began to circulate in Kiev. It was said that any time now there would be an explosion at the station because the temperature in the reactor has increased to the outer limits and the flaming core of the reactor, having melted through the concrete casing, would come into contact with the water that has accumulated under the fourth block, and then...Some assured us ("augurs of catastrophe") that there would be a hydrogen explosion (physicists denied this without equivocation), others (the "optimists")—that this was just steam. In one variant as well as the other there was little cheer. It was said that plans were being readied for an evacuation of Kiev, and many more different things, were also said...

"The Danger of an Explosion Has Been Eliminated"

The most surprising thing was that this time the rumors had a weighty basis.

From press reports:

"*Academician Ye. Velikov reported:*

" 'The reactor is damaged. Its core is a burning hot active zone; it is as if it is 'hanging' there. The reactor is covered from above with a layer of sand, lead, boron and clay, and this is an additional load on the structure. Below, in

a special reservoir, there may be water...How will the burning hot reactor crystal behave? Will we be able to hold it or will it fall into the earth? No one in the world has ever been in such a difficult predicament—we must assess the situation very precisely without making a single error...

" 'The continuing development of events demonstrated that the direction taken to deal with the damaged reactor was the correct one." (PRAVDA, 13 May 1986).

From an article by V. F. Arapov, lieutenant general, member of the Military Council and director of the Political Administration of the Krasnoznamennyy Kiev Military Okrug:

"...The representative of the government commission made the following assignment to the commander of the exemplary mechanized company, Captain Petr Pavlovich Zborovskiy:

" 'A critical situation has developed at the damaged reactor. It is possible that there is water in a special reservoir underneath it. If the concrete foundation does not hold something irreparable may happen. You must find the right solution in a short period of time and organize the pumping out of the water.'

"...The armored personnel carrier delivered Captain Zborovskiy and two volunteers — Junior Sergeant P. Avdeey and Lance-Corporal Yu. Korshunov — to the site where they were to penetrate into the building leading to the reservoir. Radiation measurement equipment showed that it would be safe to remain at the concrete wall for no more than 20 minutes. The daredevils began their work, relieving each other. Finally an opening was made and Captain Zborovskiy stepped up to meet the unknown. Soon he proposed to the government commission a dependable solution for pumping the water, and it was confirmed." (Magazine RADUGA, No 10, 1986).

Nikolay Mikhaylovich Akimov, 30 years old, captain:

"It turned out that we would have to work in the Zone with a very high level of radiation. That is why together with Captain Zborovskiy (also Lieutentant Zlobin was with him) we made a decision to first ask for volunteers. When we announced that we needed eight volunteers the entire staff that was in service, everyone, took a step forward. We selected eight people. Among them were senior sergeants Nanav and Oleynik.

"We worked during the night, by the light of lanterns. We worked in protective clothing. It was not completely comfortable, it is true, but we had no other choice. You have seen this clothing—it is of a green color, and it is called OZK—general armed forces protective clothing. The situation that had developed at the station told us that we had to act quickly and decisively. The staff understood the assignment as it should have and at the station there was no need for superfluous orders or additions, there was only work.

"We worked in the zone for just 24 minutes. During this time we laid about 1.5 kilometers of hoses, installed a pumping station and began to pump the water. Everything seemed to be going well, the water was being pumped out. But as they say, problems come in threes.

"Soon after we had put down the hoses and had begun pumping out the water, in the night darkness someone's truck mounted on caterpillar tracks crushed our hose. They were taking some kinds of measurements and in the darkness and did not notice the hoses. This is the type of lack of coordination that occurred. All of this happened in the zone with a high radiation level. There was nothing we could do. We got dressed and went there again. We went with a different group of volunteers from our company. The water was flowing under pressure and the hoses were not able to withstand the pressure and started to leak. And the water was radioactive. This spillage of water on the path of our work posed an additional danger. We had to immediately eliminate the spillage and clamp the hoses in places where the water was gushing out. All in all pressure was applied to many shadows on the hoses.

"What do I want to say about the young men? Different things happen in our lives. As they say, there is no such thing as a job without dangers. When we got there we looked...No, at first there was no fear—we went in, everything was fine. Even birds were flying around. And then, when radiation readings were made — we each had our own individual dosimeter — when we understood that our bodies were being bombarded with roentgens, then the soldiers developed quite a different attitude. I will not hide it — when the dosimeters began their readings fear appeared. Nevertheless, not a single soldier at the station showed any sign of weakness, everyone fulfilled his task with bravery and with a high level of professional skill. There were no cowards among us.

"Assignments were made outside the Zone. When we entered the Zone there was no time to give orders. First of all, it was uncomfortable — we were wearing respirators, and secondly you cannot do much ordering — everything must be done quickly. The young men did not waver, I did not notice any of that. Every one of them knew that he had taken in a dose of radiation, but each one fulfilled his task.

"Moreover, technology is technology. The pumping station was in the Zone of the very high radiation level; it operated within closed premises and it was practically impossible to be in there. But as a result of the shortage of air and the gases in the air the machine kept dying. For this reason from time to time, or about every 25-30 minutes, we entered the Zone, ventilated the premises, restarted the machine and again repeated the process.

"This is the way it went for 24 hours. We did this work on the night of 6-7 May. Then the pumping station was replaced."

"You understood that this was one of the most important operations during the entire Chernobyl epic?"

"Yes, we understood this. Especially the officers. We understood that if water entered the boiling mass there would be an explosion or at the very least an evaporation...We all understood. These were totally comprehensible actions, we knew what we were up against."

"You do not regret having chosen the profession of fireman?"

"No. I myself am from Rostov Oblast, village of Orlovskiy. This is the native region of Budennyy. The Salskiye steppes. I graduated from the Kharkov Firefighting-Technical Institute of MBD [Ministry of Internal Affairs] and was an A-student. I entered the army and have been serving in Kiev for 6 years already. So you can consider me a Kievan. I do not regret my profession, I made a conscious choice."

"During those days all of Kiev lived with terrible rumors. Did you realize that you had done something quite outstanding?"

"You know, we were relieved that we carried out our jobs. When we were able to report, 'The danger of an explosion has been eliminated.' The thought did not cross our minds that later we would be interviewed. We were thinking about something else: 'This soldier has had this much radiation. He has to wait. First these soldiers will go. They have been exposed to less.'

"We protected each other.

"And then it turned out that we were something like heros. I think that everyone who worked in Chernobyl did what he had to do. Everyone without exception. If it were not us, someone else would have been in our place. We simply went there as specialists."

Besik Davydovich Nanava, 19 years old, senior sergeant: "I was born in Georgia, in the city of Tskhakaya, and grew up there. My father is an engineer, my mother a bookkeeper. I have been serving for 1.5 years.

"How did it happen? We were sitting in the club watching a movie. There was an order: 'Firefighting company on the alert!' Immediately we all gathered and the company commander, Captain Akimov, says, 'Fellows, get ready and prepare yourselves for work.' He gave us instructions on safety measures.

"When I heard all this I remembered my house, everything. But you know, I felt that I had to, that it was essential for me to do this. Since they had called us that meant we were needed.

"On 5 May we arrived in Chernobyl, we arrived in the morning. We stood around there all day. On the 6th Major General A. F. Suyatinov arrived and the following order was given: Our special operations group must already be at its station. The company was fully drawn up and Captain Akimov said, 'Volunteers—one step forward.' Everyone took a firm step forward. Well, and the most healthy and physically fit were selected. I participated in sports and judo wrestling. We readied the trucks and checked the hoses and on 6 May at 9 p.m. we were at the station. There were four officers there—Captain Zborovskiy, Lieutenant Zlobin, Captain Akimov, Major Kotin and Major General Suyatinov. And there were eight of us—sergeants and soldiers.

"When we arrived the major general said, 'Shall we begin immediately or smoke a cigarette?' Well, we discussed it and decided, 'Let's begin immediately.' Without getting out of our trucks we immediately set off for the work site. We drove in. We are setting up the pump and beginning to pull out the hoses. At 2.30 a.m. we finished our work, returned, underwent decontamination, washed and laid down to rest in the barracks. At 5 a.m. we received an order to go there again. It was said that some kind of reconnaissance vehicle mounted on caterpillar treads had travelled over some hoses and cut them in half. And the contaminated water had begun to flow...We got up, changed clothes, arrived at the place of the accident, changed the hoses and went back. All of this took about 25 minutes. Three hours passed, and there was a helicopter on duty constantly there, and from the helicopter there was a report that a fountain was spurting through a hole in one of the hoses and must be fixed immediately. Again we were awakened. We went there immediately. We clamped it and all. We were immediately replaced and sent to the hospital for inspection.

"Now I feel good. I did not write to my parents about this. But you know what happened? I was given a vacation and went home, and my father saw the military voucher which had my radiation dose recorded on it. He asks me, 'Son, what is this from, what is it?' Of course I did not describe it in too much detail, but he understands these things and he guessed immediately. He says, 'Tell me how it was.' Well, I tried to mitigate it. I did not want to describe the harsh reality, the way it was. But they found everything out."

...The night of 6-7 May 1986 will always be a part of history as one of the most significant victories over the damanged reactor. I do not want to indulge in saccharine symbolism or be carried away by solemn comparisons. We have already been carried away, enough. But the symbolism suggests itself—this occurred on the eve of the Day of Victory. And now for me these two dates have become firmly tied together. No matter how long I live, on "short May nights" I will always remember May 1945, a devastated and burnt but triumphant Kiev—"Studebakers" in the streets, anti-aircraft batteries in Shevchenko Park being readied for a grandiose salute, tears in the eyes of the adults; and next to it — May 1986 —

armored troop carriers speeding to the Zone, and the words of one officer who came to see us in the hospital, "Lads, congratulations on your victory! There will be no explosion!"

In the collective that carried out this responsible assignment of the government commission I had the opportunity to spend some time with veterans of the Great Fatherland War. The meeting was organized by Stanislav Antonovich Shalatskiy, a handsome person, an experienced journalist, a colonel in the Soviet Army and at the same time in the Polish Forces. In late 1944 he was the editor of a newspaper for the First Tank Division of the Pantserni Polish Forces — it was in this division that the heroes of the very popular television movie, 'Four Members of a Tank Crew and a Dog,' served.

Attending this meeting was Hero of the Soviet Union, ace pilot, Colonel Georgiy Gordeyevich Golubev, who during the war was the second pilot for the legendary Pokryshkin, and the reknowned intelligence officer who saved ancient Crackow from destruction by Hitler— Yevgeniy Stepanovich Bereznyak, who is known to the entire country as "Major Vikhr."

Colonel Golubev very vividly and truthfully told about the difficult work of the fighter pilot, about the specific work involved and not about the "heroic exploits" in general — about the physical overload that ace pilots suffered, about various technical stratagems utilized by pilots during the war. If you do not shoot down the enemy, then he will shoot you down. And Bereznyak talked about the work of intelligence officers in the enemy camp, when an individual is under constant stress sensing the oppressive feeling of danger. Under such conditions it is the boldest, the calmest and the most resourceful who survive.

I looked at the young 18-19 year old short-haired lads with the red epaulettes on their shoulders and I saw how attentively they listened to the stories of the veterans. I thought to myself: In about 40 years these lads, hoary with age, will tell about the hot days of Chernobyl in the same way, and in the same way the children of the 21st century will listen with baited breath.

But if I had told this to the soldiers they would not have believed me, they would have laughed. Because today they cannot imagine themselves as being old.

Flight Over the Reactor

From the first days of the accident the situation around the damaged reactor was taken under control.

All available means—both land and air—were utilized for this purpose.

Nikolay Andreyevich Volkozub, 54 years old, senior inspector pilot of the VVS [Air force] of the Kiev Military Okrug, military sniper pilot, colonel and USSR master of helicopter sports:

"On the morning of 27 April I was told by telephone to come to headquarters with all individual means of protection. That was on Sunday. A car arrived, I gathered my things quickly, arrived at headquarters and learned about what had happened.

"I was given the order to fly to the city of Pripyat. When I flew past the station, whether I wanted to or not, I passed to the side of it and saw the entire picture. I was familiar with the area, having flown here frequently. We turned the radiation measuring instruments on on board the helicopter and already during the approach to the nuclear power station we noticed that the radiation levels were increasing. I saw the ventilation stack and the damaged fourth power unit. There was smoke and inside we could see flames within the ruins of the reactor. The smoke was grey.

"I arrived in Pripyat and heard the voice of the director. Our director, Major General Nikolay Trofimovich Antoshkin, was already there. I landed at the stadium. A vehicle drove up to me. I asked, 'Where is there another landing field?' They answered, 'Near the flower bed, near the gorispolkom.' I took off and landed near the flower bed. I arrived in Pripyat around 1600 hours. The city had already been evacuated. Only in front of the gorispolkom were there any vehicles. The city was empty. This was very unusual.

"I went to headquarters, to Major General Antoshkin. Just then two other MI-8 helicopters, which had already begun dumping their cargo, arrived. They were throwing sacks of sand and boric acid into the reactor.

"They loaded the sacks near the river terminal and carried them directly there, to the central landing field. From there the helicopters flew to the reactor. At first the sacks were not attached on the outside of the helicopters but placed right inside. When we approached the reactor we opened the door and simply dumped the sacks.

"On the 27th our helicopter pilots dumped sacks until nightfall. We reported to the government commission that we had dumped—now I don't recall so precisely—it seems about 80 plus sacks. Commission chairman Boris Yevdokimovich Shcherbin said that this was a scanty amount, a drop in the ocean. Too little. Tons were needed.

"We flew to the base and began to think: What should we do? We brought it up for discussion with the entire staff, both pilots and technicians. Dumping the sacks by hand was not efficient and not without its dangers. One flight technologist—how much could he dump out? So on the night of 27-28 April we kept thinking about how we could do this better. After all in principle the external

hanger on the MI-8 could carry 2.5 tons. On that night we had the idea to hang the cargo on the external hanger. We decided to put the sacks in the brake parachutes of fighter aircraft — they are very strong — and suspend them. We have a special attachment on helicopters that enables us to unhook the cargo. You press a button and it releases. This worked. First we worked with the MI-8's and then we used more powerful machines.

"Our command point was set up in the Polesye hotel in the center of Pripyat. From there one can see the plant like the palm of one's hand. We could see how the helicopters, after taking off from the field, followed their battle route for dumping, and it was possible to direct them. The difficulty was that we did not have a special back-sight for releasing the external hanger, that mountain of sacks that dangled under the machine. In working out the flight methodology we determined that the helicopters must fly at a height of 200 meters. They could not fly lower because of the radiation and moreover, the ventilation stack there was 140-150 meters tall. That was tight. We had to move toward the stack. It was the main orientation point. I can still see it...It will probably remain in my memory all my life. I even know where every splinter was located on it—no one had seen them yet, but I examined the stack. There were platforms on it.

"We maintained a speed of 80 kilometers. The director followed the flights with a theodolite. A point was selected, and when the helicopter reached that point the command was given, 'Drop.' We worked it out so that everything hit the damaged area of the reactor. Then we set the helicopter that controlled the precision of the target-hit higher. We took photographs and by the end of the day we could see how precise our target ability was.

"Then we came up with another improvement—we made it so that the parachute remained while the sacks fell. We unhooked two ends of the parachute. Later, when we worked with stronger helicopters and dropped lead bars, we dropped them off with freight transport parachutes earmarked for landing military equipment.

"After a few days we organized a field in the village of Kopachi. This was also close to the nuclear power station, but radiation levels were lower here.

"The fact that radiation has no taste, color or odor at first dulled the feeling of danger. No one looked at this — neither at the dust nor at anything else. We worked with all our might. We had respirators, but if you looked you would see that the soldiers who were loading the sacks had pushed their respirators up onto their foreheads, like glasses...

"Later, when we understood, briefings began, medicine came into battle and punishments were meted out.

"Later, when the wind direction changed toward Kopachi and radiation levels rose sharply we changed our base and moved to Chernobyl.

"During these flights I prepared the crews and explained to them the methodology for releasing the cargo. Crews from other areas began coming to help us. We had already gained some experience and we first trained every newly-arrived crew. We developed schemes concerning the way in which to suspend the cargo, to carry out the flight and to drop the cargo. Everything was covered in detail. You carry out the briefing and check for preparedness and sit down as the second pilot, make one more trip with them, and then they begin to make their own flights.

"After the flights there was a sanitation treatment and decontamination of the helicopters.

"On 7 May we stopped the filling of the reactor. No sooner had we stopped than at one of the meetings of the government commission scientists and specialists made a decision — in order to indicate further measures for avoiding accidents it was essential to learn what the tempterature and composition of the gases inside the reactor were. Until that time it had still been impossible to approach the reactor on foot or by vehicle because radiation levels were still very high. One scientist suggested that this task be carried out by helicopter. This was academician Legasov.

"No one had ever fulfilled such an assignment. Wherein was the difficulty of this assigment? According to its aerodynamic qualities a helicopter can hover above the ground either at a height of 10 meters (this is called hovering in the safe zone) or over 500 meters. From 10 to 200 meters is the forbidden zone. What is this related to? In general the helicopter is a safe machine. I have been flying them since 1960. It is like a bicycle to me. Any time an engine failed I was able to land safely. But if the helicopter is hovering at up to 200 meters and if the engine fails the pilot will not be able to land the vehicle no matter how well trained he is because the propellor will not have time to switch to a regimen of automatic rotation, i.e. gliding. But this is only if it is hovering. If it is flying horizontally then that's all right. A helicopter can switch to a regimen of automatic rotation only at a height of 500 meters.

"That is why one of the dangers was hovering at a height of over 10 meters. This was forbidden. This was allowed only under certain circumstances. Secondly, there was the escape of heat from the reactor. No one knew the heat characteristics of the reactor. And in a zone with increased temperatures the helicopter's power decreases. Well, and there was also the elevated radiation level. And another thing — the crew cannot see what is going on underneath it.

"Everyone understood these difficulties. But there was no other solution. Everything proceeded according to wartime standards. And the measurements needed to be taken. The task consisted of lowering the active part of the temperature-measurement equipment, the so-called thermocouple, into the reactor.

"The VVS commander flew to us and gave us the following order: 'The assignment is a very difficult one. But it must be accomplished. How can it be done?'

"He was asking me. I said: 'Of course it is complicated, but we must try. Let's practice.' I have a great deal of experience. I fly all three helicopters and for this reason they probably had the idea to assign me.

"Preparations began. I immediately thought out a plan about how to do all of this. At that time I was totally cut off from everything around me. I concentrated only on this flight. In addition to a second pilot and a flight technologist, doctor of technical sciences Yevgeniy Petrovich Ryazantsev, deputy director of the Atomic Energy Institute imeni I. V. Kurchatov, was to accompany me. Yevgeniy Petrovich explained to me that a thermocouple is a metal pipe on a cable. The director of the radiation supervisor replacements, Aleksandr Stepanovich Tsikalo, was also to fly with me. You remember the people with whom you had to work under difficult conditions.

"We had to figure out how to lower this thermocouple into the reactor. I went to our engineers, and said: 'Let's include your engineering ideas, let's think about it.' Although I already had ideas of my own.

"We took a cable 300 meters in length. You know, this is not a good incentive — an accident — but if we had worked and lived during regular times as we did then, with such efficiency, without red tape, with everyone trying with all his might, we would have had a different life...In literally half an hour the cable was ready.

"We wound the wire from the thermocouple around the cable. We hung the weight at the bottom of the cable. We laid out the cable at the airport. I selected the helicopter myself, one of the more powerful, and tested the engines. I issued orders to the crew. It's true there was no delight expressed by the crew, but this was a necessity. I calculated how much fuel to take. We did not need any excess, and for this reason a poured out some of the surplus. I started the helicopter up and flew to the cable. I hooked it on and went right from there. I raised it. We had made a circle on the ground out of the parachutes to approximate the circumference of the reactor, 12-14 meters. I began to imitate the flight. A weight of about 200 kilograms hung on the bottom. I come in smoothly, begin to hover, turn off the speed and slowly approach this circle. The guide makes corrections. I hover. He gives me the order, 'Hover precisely above that.' I find an orientation point in order to hover correctly, correlate my position, but feel intuitively that I am hovering at the precise point. I hold back the helicopter. But he says, 'You are hovering precisely, but the weight is swinging like a pendulum.' I was hovering at a height of 350 meters, but the weight was swinging.

"I hover for 5 minutes—it is swinging, I hover 10 minutes—still swinging. The swinging is not decreasing. I am hovering and thinking: What should I do? The practice is also sufficiently dangerous, but morally more tranquil—there is no radiation and no high temperatures. But from the point of view of aerodynamics it was dangerous. But you don't think about that in flight.

"I see that nothing is happening. I prepare for landing and place the cable on the field. I release it and land.

"Now I had another idea: What if we hang weights along the entire length of the cable at regular intervals? It must be stable. We strung lead bars on the cable. Our engineers did everything efficiently.

"All of this was accomplished on the night of 7 May.

"The next day I went on a practice flight with this cable. Cable tension was excellent. As soon as I touched the earth with its tip (I heard the order, 'Contact!') I moved away and the cable stood like a pole. Here you already need a jewel-like piloting technique...I made one more approach and was convinced that it was possible. The way we looked after this flight—you should have seen it...In general, a flight with an external hanger is considered to be one of the most difficult...Later I tried a few more approaches.

"On the 8th the thermocouple was brought to us. It was like a wire. The end is a sensing device. We connected everything up and laid the cable out on the landing field in Chernobyl.

"On 9 May Yevgeniy Petrovich Ryazantsev and Aleksandr Stepanovich Tsikalo arrived. We installed equipment in the helicopter. Before the flight we ourselves, the crew, made a protective barrier from sheets of lead—we put them on our seats, on the floor. The only places we could not put them was where the pedals were, where our feet were. We covered ourselves well. We were given lead aprons. We explained to our passengers how we would fly, covered them with sheets as well and agreed about cooperation. My colleague, Lyubomir Vladimirovich Mimka, followed the flight. He was located in Pripyat in Polesye Hotel.

"Well, everyone sat in the helicopter. We took off from Chernobyl without any problems. We marked the end of the cable with an orange ring to increase its visibility.

"I reached a height of 350 meters. I had to find out what the temperature there was and what kind of power the engines had. The helicopter hovered with stability.

"The flight director said to me, 'To the building it is 50 meters...40...20...' He prompted me as to our height and distance. But once I was above the reactor neither I nor the director could tell whether I had met the mark or not.

This is why another MI-26 helicopter was sent. Colonel Chichkov was the pilot. He hovered 2-3 kilometers behind me and saw everything. I was to hover near the stack...

"Yevgeniy Petrovich Ryazantsev himself was looking right into the hatch. He demonstrated through gestures that we were above the reactor. We took temperature readings at a height of 50 meters above the reactor, 40, 20 and in the reactor itself. Yevgeniy Petrovich saw everything. The equipment was recording. When we had done everything I withdrew.

"Beyond Pripyat we had marked a special place to drop the cable into sand. The cable was radioactive.

"From the time we began to hover all of this had taken 6 minutes 20 second. Yet it seemed like an eternity.

"This was a victory.

"The next day, 10 May, we were given another order—to determine the compostion of gases being emitted. Again the same thing, the same kind of cable, but instead of a thermocouple a container was attached to the end. Here the task was simpler—instead of hovering we were to fly by smoothly. On 12 May we had to repeat everything with the thermocouple. Now we had experience and some composure. We flew out again. And despite the fact that we had some experience we were not able to hover less than 6 minutes.

"During the approach, while steadying the cable, then descending and taking measurements, how did I feel? Beginning with the 27th we did not have a single peaceful night; we slept for 2-3 hours. We flew from dawn to nightfall. I am often asked, 'How does radiation act?' I don't know what acts or how, but I was extremely tired, and from what? Either it was because of the radiation, or the lack of sleep, or the physical overload, or the moral and psychological stress. After all there was stress—it was a great responsibility.

"After these three flights I flew again in order to take radiation readings.

"I spent a total of 19 minutes 40 seconds above the reactor."

From press reports:

"With the goal of decreasing radioactive emissions above the active zone a protective covering of sand, clay, boron, dolomite, limestone and lead is being put down. The upper section of the reactor has been covered with a layer of over 4,000 tons of these protective materials."

(From a speech by the chairman of the government commission and Deputy Chairman of the USSR Council of Ministers, B. Ye. Shcherbin, at a press conference for Soviet and foreign journalists on 6 May 1986. PRAVDA, 7 May 1986).

"Professor M. Rozen (director of the Department of Nuclear Safety of MAGATE [IAEA, International Atomic Energy Agency] responded positively to the use by Soviet specialists of the methodology of retaining emissions with the aid of a shield of sand, boron, clay, domomite and lead...Work is continuing on the damaged unit in order to fully neutralize the source of the emissions and to, as the physicists say, "bury it" within layers of concrete." (PRAVDA, 10 May 1986).

"From the USSR Council of Ministers. On 10 May work continued at the Chernobyl Atomic Power Station to eliminate the consequences of the accident. As a result of the measures that were taken the temperature within the reactor has decreased. According to the opinion of scientists and specialists, this attests for all practical purposes to the curtailment of the process of burning of the reactor's graphite."

Doctor Hammer, Doctor Gale

From press reports:

"On 15 May M. S. Gorbachev received in the Kremlin the well-known American industrialist and social activist A. Hammer and Doctor R. Gale. He expressed deep gratitude for the sympathy, understanding and rapid concrete aid given by them in connection with the calamity that had befallen the Soviet people — the accident at the Chernobyl Nuclear Power Plant...In the actions of A. Hammer and R. Gale, emphasized M. S. Gorbachev, the Soviet people see an example of how relations should be built between the two great peoples in the presence of political wisdom and the desire to do this on the parts of the leaderships of both countries." (PRAVDA, 16 May 1986).

On the morning of 23 July a white Boeing-727 with a United States flag on the fuselage and blue and red markings on the tail stating "N10XV," which means number one in the company Occidental Petroleum Corporation, the president of which is Armand Hammer, landed at Borispolskiy Airport in Kiev. The tireless 88 year old businessman each year "logs" hundreds of thousands of kilometers on this airplane, which is equipped with all the necessities — from an office to a bathroom, while managing a complex and multiprofile company, Occidental.

Arriving in Kiev were Armand Hammer, his wife, as well as Doctor Robert Gale and his wife and three children.

As soon as A. Hammer and his retinue arrived, they went to the cardiology section of Kiev Clinic Hospital Number 14 imeni Oktyabrskaya Revolutsiya. To the very

same one where Maksim Drach worked in the therapy unit. Putting on a white lab coat and remembering his medical youth (after all, he was a trained physician), Doctor Hammer made rounds in the department in which over 200 people who had been in the danger zone after the accident at the Chernobyl Nuclear Power Plant had been under observation. All of them had already regained their health and been discharged. On that day there were only 5 people in the department who had been summoned by the doctors for this regular repeat check-up.

Doctor Hammer sympathetically showed interest in the general well-being of each one of them. He was assisted by Dr. Gale who, having been in Kiev earlier, had already examined these sick people.

On that same day A. Hammer and R. Gale surveyed the fourth reactor by helicopter. I had the opportunity to fly with them and now in my dreams and in my waking hours I am often haunted by the following memory—the flight over the fourth reactor, soaring over the large, white lifeless structure of the atomic power plant disappearing into the dusk, above the gleaming expanse of the dead cooler pond, the meandering course of the Pripyat, the phantasmogoric intertwining of the wires and the bridge pier, the accumulation of auxiliary structures and discarded equipment. As with any recollection that has passed into the depths of time, the real forms gradually become distorted, much loses a clear outline, but the feeling of pain and alarm remain unchanged, the same as they were during that summer hours of dusk. Clinging to the portholes we, the passengers of the MI-8, looked intensely at the magical picture that riveted our gaze—the black nozzle of the fourth reactor, the damaged structures and their debris at the foot.

After flying over the fourth reactor, standing in front of movie and television cameras, Armand Hammer said:

"I just returned from Chernobyl. It had such an impact on me that it is difficult for me to talk. I saw an entire city of 50,000 — and not a single person. Everything was empty. Buildings, large buildings, all empty. The laundry is even still hanging there, they didn't have time to take down their laundry. I saw the work being done to save the reactor so that there would be no more problems with it. I would like every person to be able to visit here to see what I have seen. Then no one would talk about nuclear weapons. Then everyone would know that this is suicide for the entire world and everyone would understand that we must destroy nuclear weapons. I hope that when Mr. Gorbachev meets with Mr. Reagan he will tell Reagan everything and show him films on Chernobyl. Later, in the future, when Reagan comes to Russia, I would like him to come to Kiev and Chernobyl. Let him see what I saw. Then, I think, he will never talk about nuclear warfare."

Armand Hammer is an amazing person. Perhaps the secret of his everlasting good spirits has to do with his ability to relax in an instant. After our helicopter took off from Kiev he immediately drifted off to sleep. Doctor Gale solicitously covered him with a white raincoat. But as soon as the word "Chernobyl" was said this old, wise person was as if transformed, looking perspicaciously at the green scenery that was unfolding below us, along which the shadow of our helicopter crept like a spectral hay harvester. He noticed everything, even the 16-story houses in Pripyat, even the laundry on the balconies—all that was frozen and unnatural. And on the return trip he again fell asleep.

In the evening of the same day Armand Hammer left Kiev for Los Angeles.

And Doctor Gale and his family remained for a few days in order to meet with his Kievan colleagues, to relax in our city and to become acquainted with its memorials and museums. After all, during his first visit to Kiev on 3 June Doctor Gale was not up to this—he had to consult a group of sick people who were under treatment in the Kiev X-ray, Radiology and Oncology Institute [KRROI] in the department of Professor L. P. Kindzelskiy.

I had the opportunity to accompany Doctor Gale during his first visit to KRROI. Doctor Robert Peter Gale looks younger than his 40 years, participates in physical activity (every morning an hour of "jogging"—running at a jog-trot—was mandatory), is dark complexioned, focused and terse; his grey eyes focus attentively and probingly on his collocuter. Despite his outward dryness and typically-American business-like manner he is very friendly and it is a pleasure to be with him—he answers the numerous questions by reporters intelligently and patiently. He is also elegant. He always wears a navy blue blazer with gold buttons, a dark red tie and gray slacks. And at first his bare heels looked very amusing and touching—he wears open-backed shoes. It turns out that this is a Los Angeles style—to go barefoot. In Gale's home town it is always warm.

Before going in we all — the guest and those accompanying him — changed into white coats, put on hats, masks and scrub shoes. And suddenly we began to look a lot like each other—it was hard to tell who was from America, who from Moscow and who from Kiev. It was a family of doctors, united by a general interest in saving humanity.

I saw how attentively Doctor Gale examined the sick, how he asked questions of the victims as well as the doctors, how he thoughtfully studied the charts with analysis data and asked about the details of the care rendered by Kievan doctors. He was especially interested in cases of bone marrow transplants.

This is not surprising. After all, R. Gale is a well-known specialist in the area of bone marrow transplants, a professor of the California university system, a clinic

director and chairman of the International Organization on Bone Marrow Transplants. Kiev's Professor Yu. A. Grinevich reminded Gale that he had been a guest in Gale's California clinic. At that time Gale, having listened then to his assistants who were treating the patient, thought carefully for some time, confidently dictated the treatment plan and then, raising his arm, said, 'And may God help us.' Gale smiles, remembering that meeting, and his severe face suddenly becomes boyishly ardent. And, seeing the Kiev sick whose difficult condition has improved, he superstitiously knocks on wood with his finger — even if it does not help, it cannot hurt.

Later to my question — what does he believe in? — Doctor Gale seriously answers:

"In God. And in science."

Then, during those alarming days in June, his visit to Kiev was very short and counted minutes were devoted to conversations with the press. In July Dr. Gale felt much freer — on the day following A. Hammer's departure the American doctor, together with his wife Tamar, their 3-year old son Elan and daughters — 7-year old Shir and 9-year old Tal —went to the Kiev Institute of Pediatrics, Obstetrics and Gynecology, where the guests were greeted by the director of the institute and academician of USSR AMN [Academy of Medical Sciences], Ye. M. Lukyanov, who is chairman of the Ukrainian Division of the international organization, "Physicians of the World for Avoidance of Nuclear War."

Here, in probably the most important place in the world, where human life is born, where the struggle to continue the race of man is in progress, the children of Dr. Gale very quickly became acquainted with small patients without feeling any types of language or ideological barriers, exchanged gifts, together sang the song "Let there always be sunshine," and then little Tal played the violin, and blue-eyed Shir regretted that there was no piano available — she would also have shown off her talent...

During this time Dr. Gale was participating in professional discussions with pediatricians, obstetricians and cardiac surgeons. In the therapy division we stood for a long time over plastic incubators that were attached to complex equipment—here lay tiny beings, future people of the 21st century, who had not yet experienced any of the nuclear fears that concern us today.

The Museum of the Great Fatherland War, the Museum of National Architecture and Life of the UkSSR in the village of Pirogovo, and the Museum of V. I. Lenin — this was R. Gale's route. They represented different stages in our history, different boundaries in our lives...

In the Museum of V. I. Lenin Dr. Gale was attracted to a symbolic sculpture — a monkey sitting on Darwin's book "The Origin of the Species," is examining a human skull. The history of this sculpture is interesting. During his second visit to Moscow Armand Hammer gave V. I. Lenin this sculpture, which he had purchased in London. It is said that Vladimir Ilich, in accepting the gift, said, "Here is what can happen to humanity if it continues to perfect and cultivate weapons of destruction. Only monkeys will be left on earth."

Such was the prophetic warning of our leader.

I have many notes on conversations with Dr. Gale, who incidentally is keenly interested in literature and is himself the author of a publicistic book. I tried to select the most important from among these notes:

"Doctor Gale, what brought you to medicine? Was it an accident or a conscious choice?"

"Initially I wanted to study high energy physics and nuclear physics. To some degree this is an irony of fate because subsequently I as a doctor came into contact with the effect of nuclear energy on the body of man. But later, already in college, I decided that I want to deal with people more than to become involved in theoretical physics."

"Did this decision have to do with the special characteristics of your personality?"

"I made the decision consciously. In our society the profession of doctor is one of the most respected. I wanted to become a doctor."

"How old were you when you made this decision?"

"I started college at the age of 16."

"Was medicine a traditional profession for your family?"

"No. There were no doctors in my family. My father was a businessman."

"Are you happy with the selection of medicine as your profession?"

"Many people ask me, 'Now that you have achieved international recognition what do you intend to change in your life?' I always answer that I was completely satisfied with my life before becoming famous and I don't intent to change anything!"

"Doctor Gale, I know many oncologists and hematologists and I know that this is a very difficult profession psychologically. After all the doctor always sees death and misfortune. How do you deal with this?"

"In part you are correct, Doctor Shcherbak. Psychologically this is a difficult profession. But on the other hand this is what attracts me. After all, it is a challenge. Oncologists and hematologists must often decide very difficult questions and be in difficult situations, partly

because our knowledge in this area is limited. I think because of this, in this area of oncology there is a great opportunity for medical creativity. In college we often debated: What is better? To write music or to play music? If you are involved in cardiology, you are 'playing music.' But here in oncology you are 'writing music.' Here everything is new and unknown.

"Moreover, I have been trained as a scientific worker as well as as a physician. It is in oncology and hematology that it is very easy to coordinate the results of laboratory research with hospital work, with the real treatment of the sick individual. After all it is no accident that the first diseases to be recognized in terms of their genetic nature were blood diseases — problems in hemoglobin synthesis, for example. And you know, that the majority of Nobel prizes in the area of medicine have in recent years been awarded for research on these types of questions."

"In connection with what you have said, whom do you see yourself to be more — a doctor or a scientist? Or are you for synthesis?"

"To be a good doctor, to heal people — this is work that must occupy all of your time. Even more than all of your time. To be a real scientist—this is also more than for your entire lifetime. Sometimes I think that no one can be both simultaneously. This is especially true for our times, when both medicine and science have become so technological, so technology-intensive. But at the same time I recognize that we do not have enough people who could combine the two endeavors. This is very important. In my opinion there should be a synthesis. It is here that I feel I have a duty—to combine the physician and the scientist into one."

"How do you distribute your time under regular work conditions in your California clinic?"

"As the clinic director I spend most of my time making rounds, checking patients and talking to them. My patients often have fairly common forms of cancer — lung cancer, for example. And I care for my patients as any regular doctor would. I spend some time in managing a small research facility which is involved in the collection of statistical data on the results of the use of new methods for treating leucosis (leukemia), bone marrow transplants and other data. And finally, a very important matter in which I am involved — my own laboratory, where basic research is conducted on the molecular mechanisms involved in the onset of leukemia.

"I understand that it appears that I am scattering myself, but I do not agree with this. I focus on these three directions because a very important goal stands before us — we want to find an effective treatment for leukemia. And we feel that the first results will be achieved in a laboratory.

"What are we moving toward? What is the basic idea of our research? Not a single child should have to die of leukemia. We must do everything in our power to make sure of this."

"Are there cases of cures in your clinic? Are you able to transform acute leukemias into chronic leukemias?"

"In 1986 we were able to cure about 70 percent of the children who developed leukemia. And about 30 percent of adults. If we make a general calculation it turns out that we are successful in curing exactly half of the sick."

"That is a phenomenal result!"

"Unfortunately, most of the population understands very little about how far we have come in the treatment of leukemia. But half the sick — this is not adequate. After all, the other half die. For example, this year 20,000 Americans will die of cancer..."

"In the newspapers it was written that you have a Ph.D. What problem did you study for your dissertation?"

"My topic was life and death. The unity of life and death on a philosophic plane. In my biography, published in the U.S.A., I touch on this subject."

"Doctor Gale, what do you tell your sick patients when you give them the diagnosis?"

"I always tell my patients the entire truth and report all facts to them. I do not know whether this is good or bad but we are of the philosophy that the individual should have all of the information. The fact is that the most difficult decisions about treatment must be made by the sick person. For this he needs reliable information. This does not always work in the best way, but we simply do not have any other solution."

"Were you involved in radiation sickness before you came to Moscow and began treating patients who had suffered at the time of the accident at the Chernobyl Nuclear Power Plant?"

"Yes, we had some experience. In some cases leukemias must be treated with a bone marrow transplant. Then we purposefully subject patients to enormous doses of radiation, sometimes almost lethal doses. We have a fairly large amount of experience treating the sick who have received enormous doses of radiation on the order of several thousand ber's (biological equivalent of the roentgen)."

"Has your prognosis for the treatment of the sick in Moscow corresponded to actual results?"

"In general, yes, if we speak of general laws and statistical prognoses. But in each individual case it is very difficult to make a correct prediction. In general this is a very complicated ethical problem and a heavy burden —

making prognoses. Here I am not talking about treating the Chernobyl sick but about treating the leukemia patients in my clinic. Let us say that I know that of 100 patients who need bone marrow transplants 50 percent will survive and get better. But for those 50 percent who will die this is little comfort. We curtail their lives through our treatment. This is why each time a sick person dies in our clinic, his life shortened by treatment, I feel a personal responsibility. I must carry this burden of responsibility for their deaths but sometimes I have no choice.

"The simplest decision would be to just not do bone marrow transplants. But then we will be relinquishing the right to live of the absolute majority of sick people."

"Doctor Gale, who of the sick in Moscow do you remember best?"

"I want to say immediately that I remember each and every one of them, I remember then as people, as individuals. But some people left a deeper imprint. I especially remember three of the sick.

"The first was the doctor who worked at the reactor and who helped the affected. As a doctor he recognized all of the danger of the developing situation, he understood everything, but acted bravely. The second sick person was the fireman. When I went to Kiev from Moscow for the first time — do you remember, at the beginning of June? — I was absent from the clinic for 3 days. When I returned from Kiev he was very angry and asked me, 'Where were you? Why did you go away?' The third was also a fireman. Maybe he did not understand the danger he was in, maybe he understood, or maybe he did everything especially so as not to pay attention to the threat on his life. His behavior was very touching— during rounds he always asked me, 'How are things going, doctor, how do you feel?'"

Two of these died, one lived...

"What feelings were you governed by when you decided to come to the Soviet Union?"

"First of all, I am a doctor, and I know about the possible consequences of such an accident. Thus I considered it necessary to offer my help. Political differences do not concern me as a member of the medical profession. Our first obligation is to save people and to help them. Moreover, similar accidents can occur not only in the USSR but in the U.S.A. and other countries as well. And naturally, I hope that we will be able to expect the same kind of sympathy and help from the Soviet people."

"What do you think, is it possible to make an analogy between Doctor Hammer's visit to our country in 1921 and your visit today?"

"In a certain sense, yes. It is true, Hammer at that time was involved in the problems of fighting typhus, whereas we are struggling against the nuclear threat. The circumstances are completely different but their essence is the same. The doctors of different countries help each other. In this sense nothing has changed. But the situations, of course, bear no comparison. Just as in 1921 the very idea of an accident in an atomic reactor was absolutely unimaginable, now it is impossible for us to imagine a typhus epidemic on the scale of the one in 1921. Humanity has learned to overcome all obstacles on its path..."

"But in doing this it creates new problems."

"It will always be like that (Dr. Gale laughs). And today it is difficult for us to imagine what kinds of problems will plague mankind in 60 years."

"During your present trip you brought your children. Does this mean that their being here is safe?"

"Many people feel that Kiev has been totally abandoned by its residents or that children have been completely evacuated. One of the reasons I came here with my family was my desire to emphasize once again that the situation is totally under control and that the patients have received the needed help. I had no doubt about the safety of my visit to Kiev. I would not have brought my children under any circumstances if there had been even the minutest potential danger. I think that it is easier for people to understand such an action than a whole series of medical pronouncements and complicated generalizations."

"Do you feel that the situation in Kiev is improving?"

"Of course. Radiation levels will continue to decrease. Some things require special attention. For example, the problem of protecting the water. But all measures are being taken to protect Kiev. For example, artesian wells have been created, alternative sources of water supply have been determined and I feel that the situation is being fully controlled. In these questions I depend fully on my Soviet colleagues. I do not believe that they would subject their children and themselves to the effects of radiation, which they would consider unacceptable."

"Are you satisfied with the information you have received?"

"From the time of my first trip to the Soviet Union, particularly to Kiev, I have been surprised how honest and open we are with our Soviet colleagues. I must especially emphasize that many of us were deeply affected by the communication of the Politburo of the CPSU Central Committee concerning an investigation on the reasons for the accident at the Chernobyl Nuclear Power Plant. I feel that the assessment of the accident was completely truthful. It was probably even more direct and open than we expected and this gladdens me

deeply. I hope, and more than that, I am sure that your analysis of the medical information will be just as complete and honest as the analysis of the physical reasons for the accident."

"Would you like to come to Kiev again?"

"Not only do I want to, I will be in Kiev again. I will return to your city in October, when the exhibit of works from Armand Hammer's collection opens."

Robert Gale kept his word. It was fall, it was the same airport, it was an American airplane, but smaller than the Boeing, and on its tail were the markings, "2 OXV." Accompanying Doctor Gale was the popular American singer and composer John Denver, who sings his ballads in "country" style. Armand Hammer had entrusted Doctor Gale to open the exhibit, "Chef d'Oeuvres of Five Centuries." In speaking at the opening ceremony, he said:

"Chernobyl has become a reminder for all of us about the fact that the world must do away with any possiblity of the chance of nuclear war once and for all."

...Later, in the evening of that same day there was a concert in the Ukraina palace, all proceeds of which went into the fund to aid Chernobyl. The words of John Denver about the Piskarevskoye Cemetery in Leningrad sounded very sincere and emotional — after visiting the cemetery he wrote a song in which he praised the strength and bravery of the Soviet people and their love for their homeland...The audience listened with great liking to the pure voice of this sandy-headed fellow from Colorado. "I want everyone to know that I respect and love the Soviet people," said John Denver. "For me it is very important to be here in the Soviet Union and to sing for you, and not just to sing but to share my music with you. I want everyone to know that I feel a great respect for the residents of Kiev and the residents of Chernobyl — I admire their courage, their bravery." John Denver was applauded not only by thousands of Kievans but by Doctor Gale and his wife as well. Then there was a farewell dinner—somewhat sad, as always when you part with good friends. And then, when it was already night, we all went out to the shore of the Dnepr and sang our American friends our folk song, "Reve ta stogne Dnipr shirokiy." Both Gale and Denver listened attentively and then Denver pensively asked, "Where's Chernobyl?"

We pointed to the north, into the darkness, to where the Dnepr took its fall waters.

"How People are Tested..."

In listening to the melodic and very human songs of John Denver I thought about Vladimir Vysotsky. I remembered a fall day in 1968 in Kiev. The leaves were falling from the apple trees of the well-known Aleksandr Dovzhenko Park on the movie studios bearing his name. I was strolling near Shchorsovskiy Pavilion, expecting Vysotsky. I had seen him in the movie, "Vertical," and I thought that I would recognize him immediately. But when a short, beardless, puny person with brown hair and in a leather jacket appeared, looking considerably younger than the hero of "Vertical," it was only at the last moment that I guessed that it was he. I thus guessed that a guitar was hanging on his back. During those days the film "Quarantine" was being filmed according to my film script. The film describes how a group of doctors of a scientific-research laboratory become infected with the virus of a dangerous disease. In the film we attempted to study the characters of people and to fashion their behavior in an extreme situation. The subject of the film was to a large degree theoretical, almost phantastic, but the characters of the doctors were taken from life. Vysotsky agreed to write a song for our film, and director S. Tsybulnik, who was not in Kiev during those days, gave me the task of working on this song.

We exchanged several words and went to the pavilion where everything was ready for recording. And when Vysotsky began to sing his song, I suddenly understood why he was difficult to recognize in real life — the feeling of monumentality that marked his screen heroes was created by his well-known voice with its raspiness, and by his frenzied temperament. The miracle of the transformation occurred literally right before our eyes as soon as the first chords of the guitar were heard. I liked the song very much and we immediately used it in the film. It was performed by the wonderful actor and singer Yura Kamornyy, who later died tragically...The recording by Vladimir Vysotsky is preserved on my cassette tape. Here is that song:

The volleys of the equipment grew silent long ago,
Only the sunlight is above us.
How are people tested
When there is no more war?
Frequently we hear
Now, as before:
"Would you go with him on reconnaissance?
No or yes?"

The armor-piercer will not cry out now
There will be no burial behind the door
And it seems that everything is so calm.
And now there is nowhere to reveal oneself.
Frequently we hear
Now, as before:
"Would you go with him on reconnaissance?
No or yes?"

Peace is only a dream, I know.
Get ready, set and fight.
There is a peaceful advanced detachment,
Misfortune, and danger, and risk.
Frequently we hear
Now, as before:
"Would you go with him on reconnaissance?
No or yes?"

In the fields the mines have been detonated,
But we are not in a field of flowers.
In searching for the stars
Do not throw the depths from the reckoning.
That's why we frequently hear,
If a misfortune arises:
"Would you go with him on reconnaissance?
No or yes?"

During the days of the Chernobyl events I often rememberd this courageous song and the question posed in it: "How are people tested if there is no war?"

L. Kovalevskaya: "On 8 May we left a village in Polesskiy Rayon for Kiev, for Borispolskiy Airport. I sent my mother and children to Tyumen. I had little money by then and what I had left I gave out at the airport to our Pripyat natives. Some I gave a 3-rouble note, others — 2 roubles. Women with children were crying, I felt sorry for them. I left myself a rouble to get to Kiev. The ticket from Kiev to Borispolye costs 80 kopecks. I was all "dirty" and my slacks "stank." I was standing at the taxi stop, telephoning friends — one was not at home, the other had gone away. One address remained. I thought to myself — I'll take a taxi and go there, telling the taxi driver that my friends will pay for me. And if they are not there I will write down his coordinates and send him the fare later. I was standing there. A person came up to me, stood behind me in line and asked, "What time is it?" You know, the way fellows come up and ask a question in order to become acquainted. I was standing there angry, ugly, dirty, unwashed and unkempt...I looked at his hand to see if he was wearing a watch. He was not. Then I told him what time it was. I don't know why, but everyone always knew that we were from Chernobyl. People didn't know much about Pripyat, everyone said, "Chernobyl." Either by the eyes, or by the clothes, I don't know why. But they guessed without fail. And the fellow behind me in line asked, 'Tell me, are you from Chernobyl?' 'What, is it noticeable?' I answered angrilily. 'Yes, it is. And where are you going?' I answered, 'I don't know, I'm afraid it will be useless to go there.' And he asked, 'What, don't you have somewhere to spend the night?' 'Nowhere.' He took me by the arm and said, 'Let's go.' 'I'm not going anywhere with you,' I said. You know, I thought to myself that he is a lout who will take me to his apartment and so forth...I know about these things. No. He got in a taxi with me and took me to the Moskva Hotel. He paid for the taxi and for the hotel. Then he took me to his workplace where an old woman was on duty, fed me and took me back. I fixed myself up, washed, and only then learned his last name—Slavuta, Aleksandr Sergeyevich. He works in the republic's society of book lovers."

A. Perkovskaya: "In early May we began sending children to pioneer camps. What I did not come up against here! People knew that the assignments would be to the Artek and Molodaya Gvardiya. Parents began coming to see me. They put pressure on me to send their children to the Artek. Well, I spoke severely to such parents, I won't hide it. Frequently I had to take sins upon my soul. The situation was as follows: We were to gather for camp children who had completed the second grade and up to and inclusive of the ninth grade. People came to me and said, 'What about 10th graders—aren't they children? And where do we put the 10th graders?' Imagine a mother coming to me, she is alone, without a husband, she is on duty and her child is 6 years old. Does he have to have finished the second grade? What is she going to do with him? Naturally I wrote a different date of birth for this child without a guilty conscience. Later, when I went to the pioneer camps I heard many rebukes. But excuse me, I had no other recourse.

"In general we made up these lists. Then the Kievans began calling and asking us to take their children to camp. And so on. When I began examining the lists I found all kinds of forgeries in them. I had to announce on the radio that parents had to come with their passports and their Pripyat registrations...

"In August I went to the Artek and Molodaya Gvardiya — I was taking children there. And can you imagine? I discovered an almost grown girl from another city. She had nothing to do with Pripyat. I even discovered a girl from Poltava Oblast. I have no idea how these children got into the Artek and Molodaya Gvardiya. But they, like the others, spent two sessions at the camp...

"When in early May I brought pregnant women to Belaya Tserkov, a grandee, the third secretary of the party gorkom, came out and said, 'We must think in the government way.' They met our women in counter-plague and counter-gas outfits and carried out dosimetric readings in the street. And in that same Belaya Tserkov children were not received until evening because there was no radiation supervisor there.

"And when I was resting after the hospital in Alusht, my friend warned me, 'Don't mention where you are from. Tell them you are from Stavropol. It will be better that way.' I did not believe her. In addition, it is below my dignity to hide where I am from. Two young girls from Tula and Kharkov sat down at my table. They asked, 'Where are you from?' 'From Pripyat.' They vanished immediately. Later 'friends in misery' were seated next to me — women from Chernigov."

A. Esaulov: "In our city at the communications center on 29 April telephone operator Nadya Miskevich fainted as a result of stress. She had been sitting at the telephone lines all the time. And the director of the communications center, Lyudmila Petrovna Serenko, was also a fine person. She was the first in the city to organize watches. There was a case in which a lunatic cut out an electrical wire at the substation. He said, 'I have radiation sickness. Take me out, otherwise I will turn off the power.' He turned off the power. So Lyudmila Petrovna immediately shifted to the emergency feed. This is a Woman with a capital W.

"And here is another case. The atomic power station's deputy director for daily life and social questions, Ivan Nikolayevich Tsarenko, came to me and said, 'Help me, Aleksandr Yuryevich. We must bury Shashenk—the operator who died at the fourth unit. He has to be put into a casket and buried, but Varivod from the building administration will not give me a bus. It is our only one.' Well, here it is difficult to judge who is right and who is guilty. There was only one bus and it was needed by the living to deal with some kinds of vitally important question.

"We went to Varivod. I said, 'Listen, why are you arguing about foolishness? The man must be paid his last duty. Give me the bus.' He said to me, 'I won't.' I said, 'What do you mean, parasite, by not obeying Soviet authorities?' And he said, 'I won't give it to you anyway. Cut me up or eat me—I won't give it up.'

"Well, then I went out on the road and stopped the first bus that came my way, gave it to Varivod and took his bus for the funeral..."

Yu. Dobrenko: "After the evacuation of Pripyat about 5,000 people remained — people who had been assigned various tasks by different organizations. But there were others who did not agree with the evacuation and remained in the city it seems illegally. Primarily this was retirees. Things were difficult for them, it took a long time to evacuate them from the city. I was evacuating a retired person on 20 May. He was an old man who had a decoration, a participant in the Battle of Stalingrad. How had he survived? He went down to the military, took a few respirators and even slept with them on. He did not turn on the light so that no one would notice him at night. He had dry bread and a supply of water. When I took him out the water in the city had already been shut off because it was needed for decontamination. There was electricity and he watched television.

"Here is how he was found. His son, who had been evacuated, came to us and said, 'My father was left in the city. I did not say anything for a long time but I know there is no water now and he is still there. Let's go get him.' We came to him but he said, 'Well, all right, since there is no water I will go with you.' He put on his respirator, grabbed some buckwheat in order to be able to cook some soup. In the villages there were also such old men and women who did not want to leave their homes for anything. We called them 'partisans.' It is true that there were different people among them. There were some whose children simply had forgotten them. They did not take them with them. Or the children had easily agreed — stay here, they said, and protect the house and belongings."

Sofiya Fedorovna Gorskaya, director of school number 5 in the city of Pripyat: "Not all the teachers were able to withstand the ordeals they were subject to. Not all. Because not every one turned out to be a pedagogue. In the process of evacuation some left their classes, left their children. This was very painful for the children. This was especially true of the upperclassmen and seniors. They were very hurt that other teachers came. The teachers who left, leaving their children, explain this by the fact that they are inexperienced, that they did not know how to deal with this situation, or what to do. After they heard on television that things were normal they came back. That is a big lesson for us in the training of future teachers, those whom we select from among our young people and train for 2 years for matriculation in the pedagogical institute. Among the teachers there were 'activists' who spoke most loudly at meetings but who then disappeared. Yes, there were."

Valeriy Vukolovich Golubenko, military director of middle school number 4 in the city of Pripyat: "When the evacuation was in progress we did not move the school journals or anything else. After all, we were leaving for a short time and hoped to return to the city immediately. Well, then later when the school year came to an end we had to write school-leaving certificates for the tenth graders. We still did not have our journals and we proposed that they write their own evaluations. We said to them, 'You probably remember your own grades.' When we looked, not a single student had elevated his grade, and some had even lowered theirs."

Mariya Kirillovna Golubenko, director of middle school number 4 in the city of Pripyat:

"After we were already evacuated, here in Poleskiy, I was named a member of the committee on packages for our Pripyat gorispolkom. What completely stunned me was the kindness of our people, which we felt literally physically while unsealing packages, sorting gifts and reading letters. We give some of the things to boarding houses for the elderly, to those places where Pripyat old people who are alone now find themselves; some of the things to homes for mothers and children, and some to the pioneer camps, in particular clothing for children. Many books arrived — we gave those to the library for the special collective efforts of builders and operators of the nuclear power station. Here in the room next door there are about 200 packages and still another 300 packages are lying at the post office in Kiev. We receive very many letters from children. Leningrad's children have sent many packages with books, children's clothing, dolls, office supplies, and every package includes a letter and every letter expresses alarm and concern. Although these children are just second and third graders and far from the accident, they understand what kind of grief it involves. There are many packages from Uzbekistan and Kazakhstan with gifts of figs, dried fruit, peanuts, homemade sugar and tea. Retired people are sending soap, towels, sheets, and children most often send books, dolls and games."

But I ask the reader not to give in too much to good and tender emotions which perhaps arose under the influence of the story of the kind packages and letters, about the decent and sincere people. We should not weaken.

Because the Chernobyl events also gave rise to something else — the traditional masterpieces of native dim-wittedness and bureaucratism that was satirized long ago by Saltykov-Shchedrin.

Let me give one example:

"The Yalta city council of people's deputies of Crimea Oblast. 16 October 1986. To the chairman of the ispolkom of the Pripyat city council of people's deputies, comrade V. I. Voloshko.

"In accordance with the directive of the USSR Ministry of Health No 110 of 6 September 1986 the ispolkom of the Yalta city council of people's deputies has made a decision on 26 September 1986, Number 362 (I), concerning providing an apartment in Crimea Oblast for citizen N. M. Miroshnichenko for a family of four (he, his wife, two sons) evacuated from the zone of the Chernobyl Nuclear Power Plant. We request that you send us a certificate concerning the handing over to local authorities by N. M. Miroshnichenko of three-room, well outfitted apartment number 68 with a living area of 41.4 square meters in house number 7 on Geroyev Stalingrada Street in the city of Pripyat.

"[Signed] Deputy chairman of the gorispolkom, P. G. Roman."

Isn't this sharp? The entire country knows HOW and TO WHOM the residents of Pripyat (see chapter entitled "Evacuation") handed over their well outfitted apartments. But only in sunny Yalta they think that the apartment with 41.4 square meters of living space abandoned by N. M. Miroshnichenko on 27 April 1986 will, in circumvention of the established order, existing resolutions and elevated radiation levels, be occupied by some criminals or relatives of the aforementioned citizen.

Truly—"how are people tested?"

The atomic blast above Chernobyl with its blinding light illuminated good and evil, intelligence and stupidity, truth and phariseeism, sympathy and schadenfreude, honesty and lies, disinteredness and greed — all man's virtues and vices hidden in the souls of our compatriots as well as in those of people far from the borders of our country.

I remember the May issues of the popular American magazines, U.S. NEWS AND WORLD REPORT and NEWSWEEK — the ominous purple colors of the cover, the hammer and sickle, the symbol of the atom and the black smoke above the entire world. Screaming headlines — "Nightmare in Russia"; "Deadly Emissions from Chernobyl"; "The Chernobyl Cloud. How the Kremlin Described it and the Actual Risk"; and "Chernobyl: New Concerns About Health. Dangerous Familiarization Tour of Kiev." And the first apocalyptic-solemn words of the report: "This was the unprecedented nightmare of the 20th century..." I admit that sensational headlines and a hysterical tone are traditions for the American press, which tries to attract the reader at any cost. That is so. But even making allowances for this in these materials it was impossible to find simple human compassion for those who suffered as a result of the accident, and behind the ominous medical-genetic predictions one did not feel a shadow of alarm for the lives and health of the children of Pripyat and Chernobyl. I was especially surprised by the coldly political tone of an article by Felicity Beringer in the newspaper THE NEW YORK TIMES of 5 June 1987 — this woman (woman!), manipulating her pen with the characteristics of a robot, as if cutting with a scalpel into a live being, reported from the Artek Pioneer Camp, where the children of Pripyat were living at the time. Nothing in her words spoke of the eternal womanly, maternal compassion — only of a hateful propoganda-type lack of understanding of all that was told to her by 11 and 12 year old children who were stunned by what had happened and who missed their homes, where they would never return...

But then in the foreign reports on Kiev radio I became acquainted with dozens of letters that had arrived during those days from the United States and Great Britain. And I thought how much the common people in these countries as well as here stand above primitive propoganda stereotypes.

In July 1986 the fireman's section of Chernobylskiy Rayon, the place where "Grandpa" Khmel and his comrades worked in April, received an unusual gift from their comrades in the U.S.A. — a memorial plaque with a message from the 28th Fireman's Division of the city of Schenectady in the name of 170,000 members of the fireman's associations of the U.S. and Canada. Here it is:

"The fireman. Often he is the first to arrive where the danger is. That is what happened in Chernobyl on 26 April 1986. We, the firemen of Schenectady, state of New York, admire the courage of our brothers in Chernobyl and deeply mourn the losses they have borne. There is a special brotherhood among the firemen of the world, people who respond to the call of duty with exceptional bravery and courage."

In presenting this message to Soviet representatives in New York, the vice president of the International Association of Firemen, James Makgovan of New York, and Captain Armand Kapulo from the city of Schenectady, spoke with great respect about our people in the name of all honest Americans, who they emphasized are in the majority. They recalled the principle adhered to by decent people of the entire world — symphathize with those in misfortune, help them, do everything possible to alleviate their misery as quickly as possible.

...To the question posed by Vladimir Vysotsky, "How are people tested if there is no more war?" in 1986 we could give a simple answer — people are tested according to their attitude toward Chernobyl.

What a shame that Vladimir Vysotsky was no longer with us, that his sorrowful and courageous songs about Chernobyl were not written. About those who went into the fire. Vysotsky was very needed there, in the Zone.

The Last Warning

Exactly 100 years ago, on 2 June 1887, visiting in Roslavlskiy Uyezd [lowest administrative division] of Smolenskaya District about 300 kilometers from Chernobyl, Vladimir Ivanovich Vernadskiy, who became a leading Soviet scientist, academician and first president of the Ukrainian Academy of Sciences, wrote to his wife:

"The observations of Estred, Ampierre and Lents have laid the foundation for the study of electromagnetism, which has inexpressibly greatly increased the powers of man and which in the future promises to completely alter the structure of his life. All of this arose out of observations about the special characteristics of magnetized metal...I have a question — do other minerals have similar properties?...and if they do, won't this open up a whole series of new powers for us, won't it give us the opportunity for new applications, won't it increase the power of people tenfold?...Isn't is possible to conjure up unknown, frightening forces in different embodiments?..."

This quote is taken from an interesting article by I. I. Molchalov, "First Warnings About the Threat of Nuclear Omnicide: Pierre Curie and V. I. Vernadsky," which was published in the third issue of the journal VOPROSY ISTORII YESTESTVOZNANIYA I TEKHNIKI in 1983. Omnicide is a relatively new term meaning the universal killing of people.

The letter by the young 24-year old graduate of the physics and mathematics department of Peterburg University 10 years before the discovery of radioactivity by A. Bequerel, probably contained the first warning in the history of mankind concerning the approaching new era which has so painfully touched us in Chernobyl, promising complete destruction of mankind (omnicide) in the case of the military use of nuclear weapons.

All of his life V. I. Vernadsky worried first about the unclear and then about the clearer and clearer prospects for the use of this frightening force:

"We, the children of the 19th century, have at each step become accustomed to the force of steam energy and electricity; we know how thoroughly they have changed and continue to change the entire social structure of human society. And now we have before us in the phenomenon of radioactivity the source of atomic energy, which surpasses a millionfold all those sources of energy which were pictured in man's imagination. Unwillingly with trembling and anticipation we turn our eyes to the new force that is being revealed before man's consciousness. What does it promise us in its coming development?...It is with hope and apprehension that we look at our new protector and ally" (1910).

"Radium is the source of energy, it works in a powerful and still little-understood manner on the body, bringing about incomprehensible but startling changes around us and within us...You experience a strange feeling when you see these new forms of material extracted from the depths of the earth through the genius of man. These are the first seeds of the power of the future. What will happen when we will be able to obtain it in any quantity?" (1911).

And so during those days when radiation supervisors still walked the streets of Kiev and there was serious discussion about the question of carrying out complete defoliation (freeing of leaves) of the famous Kievan chestnuts and poplars, I came to the house in which Vladimir Ivanovich Vernadsky worked in 1919-1921. On the building housing the Presidium of the UkSSR Academy of Sciences there is a memorial plaque in memory of this brilliant man. It seemed as if he were standing at the window of the president's office and inquisitively looking at us from the depths of Kiev's past when cabbies clattered past this house with its square beams and when hardly anyone in the work had heard the word radiation. And no one at all listened to the prophecy of the scientst.

I came to see the vice president of the UkSSR Academy of Sciences, the reknowned Soviet botanist and ecologist, *Academician Konstantin Merkuryevich Sytnik.* Here is what he said:

"This is a tragedy, a great human tragedy, which has directly touched hundreds of thousands of people. A new ecological factor has come into play. I would not overstate this, but it is worse to underestimate it. Of course we should not permit ourselves, having become involved in discussing the Chernobyl problem, to forget about the fact that today the factories of the Ukraine continue to send up smoke, that the pollution of the Dnepr water basin with chemicals and metals is continuing. However, a new factor related to the accident does exist, and this is the factor of negative attributes.

"People are very concerned about radiation's existence, and this is natural. Most of the population has never been interested in what the outside limits are for nitrous oxide or anhydrous sulphide. However, today they are very concerned about the levels of alpha, beta and gamma rays. This can be explained by the fact that for years we have talked about the tragedies of Hiroshima and Nagasaki and have discussed in detail the enormous danger of radiactivity for man. People gradually accumulated all of this in their consciousness and their attitude toward radioactivity is that it is a factor with

much risk involved. Here a certain psychological phenomenon, a certain gap between emotion and knowledge, exists. Everyone knows that industrial emissions into the environment include carcinogens, but this does not give rise to special emotion.

"Radioactivity is another matter. People's attitude is extreme alarm — people fear for their children and grandchildren because we have said a great deal about long-term genetic consequences. This has to be looked at by both scientists and the means of mass information.

"We must objectively and soberly explain the existing situation without shrugging off people's alarming questions. We should not fear bringing about a panic because the reason for panic is a lack of information. Yet we just repeat one thing, like parrots — the food is clean, it is checked and so on. But if I myself do not believe this, if I myself do not drink milk for several months how can I assure people about the safety of a product? Go to a train station and look at what people are taking from Moscow. Bags full of produce. Most of the people do not trust what we write.

"For example, in their overly-optimistic broadcasts in June-July physicians kept insisting that it was safe to swim in the Dnepr in the Kiev area. I felt at that time that one should not swim there at all. My reason was that at the shore, in the silt, there was a large accumulation of radioactive nuclear particles at that time. Nothing would have happened to Kievans if for one year they abstained from swimming or did not go into the forest to pick mushrooms.

"At the same time, of course, we should not complicate this matter. Why? Because within nature there is an enormous process of dilution, of dispersion of radioactive particles, and this saves us. Recently how often has mother nature been our savior. I am speaking about the trees, the land and the waters of the Kiev sea which absorbed most of the radioactive emissions. How much we have cursed the Kiev sea, hanging over our city, but in this situation it has turned out to be a very useful collector, absorbing in its silt a portion of the radioactive particles which then settled to the bottom. The sea turned out to be radiation-intensive, it absorbed a portion of the particles and we hope that in the final analysis there will be a diffusion of radioactive particles to insignificant concentrations.

"The question of water is more familiar to me because I am the chairman of a workers' group on monitoring (tracking—Yu. Shch.) the condition of the water in the Dnepr basin. The Dnepr is an important element in all of our concerns, and perhaps even the most important. After all, the water of the Dnepr basin is utilized by a population of 35 million in the Ukraine. Immediately after the accident a number of urgent measures were taken to protect water sources and I can say that the population of the Ukraine receives good-quality drinking water. I say this with complete assurance.

"At the same time we must be ready for any unexpected occurrences. To this end we together with the Institute of Cybernetics imeni V. M. Glushkov have created a mathematical model for studying and predicting the condition of the water in the Dnepr basin. This model foresees different, even to the utmost extreme, possible situations; an entire complex of special measures has been developed for each situation. But so far extreme situations have not arisen...

"What are the lessons of Chernobyl? Recently we held a routine scientific conference on the problems of Chernobyl and its consequences. No fewer than 100 people gathered, all with figures, graphs and computations. Physicists, biologists, geneticists. There were interesting reports, and among them very optimistic ones. And this was not that forced optimism about which Chingiz Aytmatov wrote. Remember, in "Plakha" [Block]: 'How long are we going to make assurances that even our catastrophes are the best?' No, within our own midst we are very honest. Still, a series of objective data still makes us optimistic. But we have to be able to talk about this in such a way that people willbelieve us. We have to find scientists who speak convincingly, with facts and figures, in order to instill trust in listeners and television viewers."

"And of course one of the basic lessons — the moral lesson. In connection with the accident in Chernobyl there has been a sharp increase in the bitterness toward and disappointment in science. After all you also talked about this at the conference of Ukrainian writers?"

"I did."

"But the problem is not so much with science itself as with the moral qualities of some scientists. Very frequently we have the following situation. There are 2-3 scientists with approximately the same rank and title. One of them says categorically "no" but the other two say "yes." What should the person making the decision do? Naturally he picks the answer that appeals to him most. Unfortunately, even the scientist who says 'no' does not always try to defend his point of view, to fight for the truth, to speak at high-level forums and so forth. Even he does not want to experience spiritual discomfort or to conflict with powerful people and departments.

"Probably the most important lesson of Chernobyl consists of the fact that any, even the smallest moral flaw, in a scientist, any compromises in conscience must be severely punished. But we have forgotten that at one time we did not shake the hand of a dishonorable person. Now the responsibility of scientists for their own discoveries and for the expert opinion on large structures has increased a thousandfold. The scientist must undergo trial by fire for his ideas, his convictions. But do you see this frequently?"

These are the types of conversations that were carried on in the building illuminated with the name of V. I. Vernadsky, who in 1922 said:

"The scientist is neither a machine nor an army soldier fulfilling orders without argument and without understanding what these orders lead to and why they are being carried out...For work on atomic energy it is essential to recognize one's responsibility for what is discovered. I would like this moral element to be recognized in scientific work, in work that would seem to be so far removed from the spiritual elements of the human individual, such as work on the atomic question."

Chernobyl routes brought me to Moscow too, to the place where 40 years ago, on 25 December 1946, the first uranium-graphite F-1 atomic reactor began operating in Europe — "physically first." At that time it was located in a suburb of Moscow, Pokrovsko-Streshnevo, with a thick pine forest. Incidentally, the pines are still there. Now the Institute of Atomic Energy imeni I. V. Kurchatov is located there.

I came to see Valeriy Alekseyevich Legasov, academician, member of the Presidium of the USSR Academy of Science, first deputy director and director of an institute department and recipient of the Lenin and USSR state prizes. Valeriy Alekseyevich's main scientific interests are related to nuclear technology and hydrogen energetics, plasma chemistry and the synthesis of the combination of inert gases. But in 1986 the name of academician Legasov resounded through the world in connection with the elimination of the accident at Chernobyl. Valeriy Alekseyevich came to Pripyat during the first day of the accident and was made a member of the government commission.

I became acquainted with Academician Legasov long before I actually met him. Working on the scientific-publicistic move, "Introduction," (movie studio — Kievnauchfilm), I, sitting in the clipping room, ran the film of the interview of Valeriy Alekseyevich with the camera crew several dozen times. The following words sank into my soul:

"I would like to focus attention on the fact that for many years this disease — inadequate attention to the new, an inability to illuminate the new — has become an chronic disease and it is not so easy to eradicate. It has become chronic because during the childhood years not much effort is made to value the new and to distinguish the new from the old. If you go into any class to listen to how the lesson is going, regardless of whether it is a humanistic or scientific subject, as a rule you will find that children are simply given explanations — what a good book it is, what a precise equation, what a good experiment. But not once will you hear the question, 'How would you do it better? What aspects of this experiment are not good? How is this book unsuccessful?'

"But after all it is with the rejection of that which seems to be good and idealistic that creativity begins, that there is striving to do something better. Our schools are more likely to teach us to use what is available and not to reject that which has been achieved or to create something new."

I thought this idea was very important, that it revealed one of the reasons for many of our misfortunes, including in Chernobyl. Because our schools puts all their efforts only into educating obedient, well-mannered, efficient and dependable boys and girls, little appeasers, without educating in them the spirit of criticism or an objective approach that considers all pros and cons as regards natural phenomena and social reality. Standard thinking is included, whereas criticism (and more often lack of faith and cynicism) are taught to the young person in the street and sometimes by their own familiar books. But often a schoolboy is left alone to come to terms with all of this.

It was very interesting to talk to *Valeiy Aleksandrovich Legasov* about the lessons of the accident at the Chernobyl Nuclear Power Station:

"It so happens that even before the Chernobyl accident I was involved in questions of industrial safety and in particular in the safety of atomic power stations. In connection with the bombing by Israel of a nuclear research center in Iraq, scientific and wider circles discussed the consequences of a possible attack on the atomic power plant. This was the theme of our article in the journal PRIRODA (V.A. Legasov, L. P. Feoktistov, I. I. Kuzmin: "Nuclear Energy and International Security," PRIRODA, 1985, No 6). Already at that time, in examining this question we came to the conclusion that it is madness to have a war when there is a fairly high concentration of atomic power stations. Extremely large regions would be radiation-infested for a long time.

"But for every judicious individual another question arose: And what if we ruled out atomic energy? What if instead we set up some kinds of power equivalents in the form of gas, coal or fuel oil power stations? And so we began to discuss it, I repeat, before the Chernobyl accident. Let's say a bomb hit a nuclear power station. This is bad. But if it hits not the atomic station but a power station built instead of the nuclear plant? We saw that this would be bad too. Explosions, fires and the formation of poisonous compounds would kill a large number of people and would make noticeable regions unuseable, although for a shorter period of time.

"After such assessments you reach the following point of view — things now have to do not so much with the type of technology but with its scale and concentration. The level of concentration of industrial capacities is such today that the destruction of these structures, whether accidental or intentional, results in serious consequences. In its development mankind has created such a

density of energy sources and various potentially-dangerous components, whether biological, chemical or nuclear, that their conscious or accidental destruction today results in great inconveniences.

"Today the duplication of various objects and the concentration of large capacities have become problems. In its time a limited number of nuclear plants was put into operation, with dependability achieved by the highest levels of training of personnel and by the careful adherance to all technological rules. Here, behind the window, the first native reactor is in operation, and it operates dependably. But then later, when dependable technical solutions proved themselves well, they began to be mass produced while at the same time the capacity of theseobjects was increased. But the approach to the small number of such structures and to the large number with large capacities must be completely different.

"There was a certain qualitative leap — these structures proliferated, they became more powerful but the attitude toward operating them deteriorated."

"Why did this happen?"

"I think that inertia was very great. The need for electrical energy is enormous. We had to introduce and assimilate capacities quickly. And quickly means not changing the previously-developed drafts. The number of people involved in the manufacture of equipment and in its operation grew swiftly. Methods of training and education already could not keep up with the pace of development.

"It would have been relatively simple if we could have identified the enemy in the form of, let us say, the nuclear reactor or nuclear energy. But this is not so. And even if we reject this technical method and replace it with another, that one will not be okay either. It will be worse. Here is the thing. Because the enemy is not the technology. The enemy does not lie in the type of airplane, the type of atomic reactor or the type of energy. If we look at this as a large-scale problem, the main enemy is the very method of developing and carrying out energy or technical processes, which depends on man. The most important thing is the human factor. Whereas previously we looked at safety technology as a means of protecting man from the possible effects of the machine or from some kinds of harmful factors, today another situation has arisen.

"TODAY TECHNOLOGY MUST BE PROTECTED FROM MAN. Really — from man, in the hands of whom shocking power is concentrated.

"To protect from man in any sense — from the errors of the builder, from the errors of the designer, from the errors of the operator who is running the technology. And this is a completely different philosophy.

"Today what kind of international tendencies are being seen? The number of accidents — if we take the number per 1,000 persons or according to other indexes — is decreasing. But whereas accidents are less frequent, their scale is increasing."

"It is like an airplane — previously in a plane crash 14 died, now 300 may die."

"Exactly right. Here is the first conclusion: Chernobyl has made it clear that mankind has not hurried to change its approach to safety, its philosophy of safety. I must say that this is not just a native backwardness. It is an international backwardness. Thus we have the Bhopal, Chernobyl and Basel tragedies.

"It would be impossible, improper and foolish to turn away from the achievements of man's genius. To turn away from the development of atomic energy, the chemical industry or something else. This is not necessary. But two things have to be done. First of all, we must properly understand the effect of serious new machines and types of technology on the environment and secondly, we must develop a system of interaction of man and the machine. This is not a problem just for the individual man working with this kind of machine but a much more universal and important problem. After all, this kind of interaction results in serious catastrophes and troubles from oversights, foolishness and improper actions. It is not important who acted improperly — the head of the station or the operator.

"Today we must seek the optimum system. The optimum in automation, the optimum in solving all organizational and technical questions related to such complex technological systems. While doing this we must create protective barriers as much as possible for instances in which man makes a mistake or machines turn out not to be dependable.

"Here I want to express, for the first time, a perhaps unusual idea. Up until now we have been discussing the known. We see in hindsight that at every stage there is some type of incomplete work or maybe slovenliness. This is true at all stages — from development to operation. These are generally known facts, they are presented in the decision of the Politburo of the CPSU Central Committee on the reasons for the accident at the Chernobyl Nuclear Power Station. I kept thinking: Why does this always occur?

"And you know, I come to a paradoxical conclusion — I do not know whether my colleagues will agree with me or whether they will throw stones at me but I conclude that it is because we have been greatly carried away by technology. Pragmatically. With bare technology. This encompasses many questions and not only safety. Let us think about it. Why is it that at a time when we were much poorer and when the situation was much more complex, we were able, in a historically insignificant period of time — in the 1930's, 1940's and 1950's — to

amaze the entire world with the pace of development of new types of equipment and to be well-known for quality? After all, the TU-104 was a quality airplane when it appeared. The atomic station created by Igor Vasilyevich Kurchatov and his companions-in-arms — this was a pioneering and good decision.

"What happened and why?

"The first attempt was to explain it with some kinds of subjective organizational factors. But this is not very serious. We are a powerful people with enormous potential. Every director and every organizational system has at one point or another utilized successful solutions and less successful solutions, but they could not affect us so extensively.

"And I reached the following paradoxical conclusion: That technology of which our people is proud, which finished with the flight of Gagarin, was developed by people who stood on the shoulders of Tolstoy and Dostoeyvsky..."

"That is an amazing conclusion coming from the mouth of a technical specialist."

"But I think that this is so. People developing technology at that time were raised with great humanistic ideas. With outstanding literature. With a high level of art. With excellent and correct moral values. And with the bright political idea of building a new society, with the idea that this society is the most progressive. This high moral feeling existed in everything — in relations with each other, and in attitudes towards mankind, toward technology and toward their obligations. All of this was included in the education of those people. For them technology was simply a means of expressing the moral qualities within them.

"They expressed their morality in technology. Their attitude toward the technology they developed and put into operation was the very same attitude that was taught to them by Pushkin, Tolstoy and Chekhov and that governed the rest of their lives.

"But in subsequent generations which took over many engineers stood on the shoulders of "technocrats" and saw only the technical aspects of the matter. But if someone is educated only on technical ideas he can only reproduce technology and improve it, but he cannot create anything qualitatively new or responsible.

"I feel that the common key to all that has occurred is that for a long time we have ignored the role of the moral beginning — the role of our history, of our culture — and this is, after all, part of the same chain. All of this has resulted in the fact that some of the people could act with inadequate responsibility at their posts. But even one individual working badly creates a weak link and the chain breaks.

"By the way, if we listen to those directly at fault in the accident, in general their goals were the most well-intentioned. To fulfill their assignment, to carry out their task."

"Valeriy Alekseyevich, did they understand at all what they were doing?"

"They thought they were doing everything correctly and well. And so they violated rules in the name of doing things better. I think that is the way it was."

"But nevertheless did they understand that they were violating all of the rules for operating the reactor?"

"They could not but have understood this. Could not. Because they violated basic laws. But someone felt this was safe, someone felt that it would be superior to do things this way than in the way the instructions stated because you see the goal was a worthy one — to get it together and complete their assignment during one night at any cost. At any cost.

"It is true, this does not apply to those who with extreme irresponsibility allowed the testing and confirmed the program for carrying it out. The purpose of the experiment was as follows. In case the delivery of steam to the turbo unit is interrupted — this is an emergency situation — diesel generators are supposed to kick in at the power stations. They achieve the necessary parameters for supplying electrical energy to the unit not immediately, but within a dozen seconds. During this time the generation of electrical energy must be provided by the turbine which has lost its steam but which is still turning by inertia. It was necessary to find out whether the turbine would continue operating until the diesel generator reached the necessary parameters. The program for this test was extremely carelessly set up; it was not coordinated with the station's physicists, or with the reactor's builders, or with the designers or with the respresentatives of Gosatomenergonadzor [State Atomic Energy Surveillance Association]. Nevertheless, it was confirmed by the senior engineer but then was not controlled personally by him and was altered and violated during the test process.

"The low technical level, the low level of responsibility of these people — this was not a cause but an effect. It was a consequence of their low moral level.

"Usually things are understood in this way: Aha, an immoral person is one who allows himself to take bribes, for example. But this is an extreme case. But is a person moral if he does not want to improve his blueprint, if he does not want to sit up at night, worry, does not want to seek a better solution? A person who says, 'Why make an effort if I can make a decision that appears to be normal professionally although it is not an optimum or the best?' And thus begins the process of dissemination of technical backwardness. We will not be able to deal with

anything if we do not reestablish a moral attitude toward the work we are carrying out, no matter what type of work it is — medical, or chemical, or reactor work, or biological."

"But how do we reestablish it, this moral attitude?"

After sighing and a long pause:

"Well, here I cannot be a prophet."

"Still, Valeriy Alekseyevich. Imagine that you are the minister of education or a man deciding the fate of schoolchildren. What would you do?"

"In part I have already talked about this. We must reestablish a feeling of responsibility, a critical attitude, a sense of the new. There was a period of time during which external circumstances interfered with this. But today we have a favorable period for this. Please — nothing is interfering with the reestablishment of the very best native or national, in our multi-national country, traditions. No one is interfering with that. But how should this be done? Should we increase or decrease the proportion of particular subjects? I do not know. But I am sure that interesting people must be brought to the schools. After all Russia has always been strong in that the teacher has usually been looked upon as an ideal by his students in terms of moral attitudes.

"And I would also like to talk about the indivisibility of general and technical culture. These are indivisible things. If you remove a piece of it that is related to the history of our homeland or to our literature, if you weaken attention to something, this will without fail boomerang to the degree that culture is indivisible. In the same way, everything cannot be given to literature and art while technology is forgotten. Then we would be a helpless society. A natural problem arises — the problem of harmony."

"Let's return to Chernobyl. How did you live through this event, both as a person and as a specialist? Didn't you have a guilt complex, not of personal guilt, but a physicist's guilt for what had occurred?"

"I would say this. I had a feeling of anger. And vexation that here, in this institute, where specialists issued all the necessary warnings and proposals, we turned out to be insufficiently powerful and armed to implement the necessary point of view. We wrote reports and many of us made speeches and we felt the danger of the complication of technological systems without a change in the philosophy of their development. We had ready recommendations. Well, for example, the most important warning element would have been the development of diagnostics systems. We fought for these diagnostic systems, tested some of them, demanded their development and everywhere described the danger of the fact that we have a shortage of computers to develop the necessary models and to evaluate the situation, to train personnel. But it turns out that we demanded too little and did a poor job of explaining. In this sense there was a feeling of anger. To be angry at the physicists or even more so, at physics, is the same as hitting a gutta percha copy of the director with a stick, as is done in Japan. Physics is the leading science in technology; it cannot be guilty of anything. Only people who utilize it poorly can be guilty.

"And how did I live through it as an individual? On Saturday, 26 April, I was called from the aktiv, I was "dressed up" and flew there that way. Not one of us expected an accident of such a scale. We were incorrectly informed from the plant while we were in Moscow. We received contradictory information. According to one set of information everything was going on there — a nuclear accident, radiation danger and fire, generally all types of danger were mentioned. Then we received information that attempts were being made to operate the reactor. If an attempt is being made to operate the reactor this means it still exists and there are no special problems. But when we arrived, it was in the evening on Saturday, and I saw the red glow of a fire, this was staggering and immediately indicated the seriousness of the situation. And later there was no time for emotion — it was necessary to immediately devise ways to measure what and how, to do what and so forth. On that evening we only assessed the radiation situation; moreover, the most active 'radiation specialist' was professor Abagyan Armen Artavazdovich. Next day, when I arrived at the reactor ruins in the armored troop carrier, that is when the feeling of anger of which I spoke to you appeared. And I also realized that we were not prepared for such a situation. We had no solutions that were thought out ahead of time and no technical means. After all what had occurred? It was always said that the likelihood of a nuclear accident was extremely small. And the designs of nuclear power stations actually did bear this out. But still the minute possibility was not zero. This meant that an accident like this could have occurred once in 1,000 years. But who was to say that this once could not have happened during one of our years? During the year 1986? Nevertheless, the possibility of an accident is not foreseen before this event of little likelihood occurs.

"It is true that after a while when I had to travel to Vienna to a meeting of IAEA, I became convinced that all of international science and technology, as practical experience has shown, has not been very prepared for this type of accident...

"And I will say this too. Perhaps this sounds paradoxical, but as soon as the intensity of the alarm abated I began to feel satisfaction from the work being done. In my opinion, I am not alone, completely not alone, in these emotions. Because conditions were created during which real work was taking place — without papers, without red tape, without submitting something for someone's approval. A colossal responsibility was put on the government commission, especially during the first days. It was only after the situation was much calmer, later, that

all kinds of decisions had to be submitted for approval. But at that time it was thus: Everyone helped us, everything was available to us, but all of the responsibility for decision-making was placed on the shoulders of people who had come there, and especially on the shoulders of B. Ye. Shcherbin. And this turned out to be very helpful. The situation was a dramatic one, but under conditions of independence accompanied by responsibility we were successful, through the organized efforts of the majority of people, in limiting the number of injured and in localizing the accident fairly rapidly.

"Scientific decisions also had to be made there. The first of these involved localizing the accident. We did not have a behavior algorithm for such situations. And the only field of action was the air, at a height of no lower than 200 meters above the reactor. What should we do? The first thing we established was that the reactor was inoperable. In these gamma fields neutron detectors did not operate; all neutron channels were inoperable. This meant that according to the ratio of short-life isotopes and to the activeness of their formation it was necessary to establish that there was no new production of rapidly-decomposing isotopes. Scientists were convinced that there were no new emissions. The reactor was not operating. But the graphite was burning, which meant that air was being sucked in from below and some cooling was occurring. This meant that it was possible to stabilize the process naturally, to do nothing and await the natural cooling of the reactor. It is true that the wait is a long one. Why is this good? This is good because the danger of the passage to the bottom of the Zone, the danger of the melting of the bottom and the pollution of ground waters would have been eliminated naturally. And then there would not have been any problems.

"But then in the atmosphere the activity of the reactor in terms of aerosol products of burning and increased temperature would be considerably greater, and the scale and intensity of the pollution would be very extensive. Covering the remains of the reactor from above meant decreasing the danger of air pollution but an impairment of temperature reduction, i.e. the creation of the danger of a warm-up and the movement of the fuel mass in the a downward direction. A decision had to be made. Then it was decided to do the following — to cover the reactor from above with materials that would filter but at the same time wouldstabilize the temperature. This was the reason for the low-melting metal (while it is melting the temperature does not increase), which protects from radiation, and for carbonates, which absorb the reactor's heat for their own breakdown and which release carbon dioxide during breakdown, therebyhelping to stop the burning of the graphite.

"A problem unprecedented in the world was being decided.

"Traditional equipment usually was not suitable either because the site of the readings was inaccessible or because of the temperature or radiation fields. In a short period of time many specialists and organizations had to invent new methods and new technical means for measurement, for securing the active particles at the site so that they would not be borne away by the wind, for building and for decontamination. A great deal was done, and as we can already see, with the achievement of the goal. Western experts would later call these methods innovative and effective. It is just a bitter regret that all of this was developed rapidly not before but after the fact. During the first days it was necessary to work intuitively.

"The last thing I want to say has to do with young people. Of course I had occasion to meet with different situations, sometimes not very agreeable. But among them were others that gave rise only to admiration. Things have already been written about the heroism of the firemen. Some, reading this, fussed that the firemen were at the control point too long and in vain and were overexposed to no purpose. But this was true heroism, and moreover justified, because in the machine hall there was both hydrogen and oil...The firemen did not allow the fire to develop, and it could have destroyed the neighboring unit. The first step toward localizing the accident was a correct one.

"And how the military pilots worked! That was truly an accomplishment. They worked irreproachably and professionally. There were very many young fellows in the chemical divisions. Reconnaissance was their responsibility. They worked completely fearlessly and precisely.

"You know, everything proceeded harmoniously there. I cannot say that the young people there worked more than others, but the fact that the young people behaved with dignity is a fact. The physicists — both from Moscow and Kiev — got right into the thick of it. I would say that the young people who worked there exhibited high human and professional qualities."

Vladimir Stepanovich Gubarev, writer, journalist, recipient of the USSR State Prize, and author of the play, "Sarcophagus:"

"Everything that happened in Chernobyl and around it is very bitter to me. I feel that in the history of our country this is the third major event.

"The first was the Tartar-Mongol yoke. We shielded Europe from the hordes and barbarians. The second was fascism. We saved Europe from fascism. And now we are securing man's future at a very costly price.

"The tragedy of Chernobyl, and herein lies its special quality, has to do with the fact that we have met with a manifestation of atomic energy precisely in the form of the so-called 'peaceful atom.' There will be no more such catastrophes. This I can say with complete assurance. The future of civilization is impossible without atomic energy. But Chernobyl exists. For this reason, when we are building this future we must take the lessons of

Chernobyl into account. Before Chernobyl we approached this very easily. For this reason we are laying the path toward a civilized future at a very high cost.

"I would be a very primitive person if I described documental events in artistic form. Naturally a great deal of that which was the basis for the play was born in Chernobyl, where I worked as a PRAVDA reporter. But I can say quite clearly that I had no specific person in mind. I tried to create typical figures."

From the play, "Sarcophagus," (magazine ZNAMYA, No 9, 1986):

"*Sergeyev:* For a long time no one there realized what had happened, and this is why, just in case, they did not report it to Moscow. They were waiting for something...

Bessmertnyy: It seems to me that it was a very serious accident. On the radio they aren't saying anything for some reason.

Sergeyev: So it was an explosion after all?

Ptitsyna: Of course. It's just that for some people it was just something they did not need, and they are trying to prove that the reactor fell apart with the accident. A fire. Simply a fire."

V. Gubarev:

"When I started writing 'Sarcophagus' I had a real desire to consider these events from a philosophical point of view. I wanted to show that we are living at a totally different time than we ourselves imagine. That we are living in the atomic space age, that it has its own laws, its own philosophy, and its own responsibility on the part of people with regard to events and their consequences."

From the play, "Sarcophagus:"

"*Bessmertnyy:* But which, excuse me for the non-literary term, son-of-a-bitch turned off the emergency system?! I wanted to say that this is —murder. Not suicide, but murder!...

Physicist: ...The most important thing for us is to find out who did away with the emergency system.

Bessmertnyy: Who did away with it? Who did away with it? The system did away with the emergency system. The system of irresponsibility.

Operator: But we are all in a rush, in a hurry; we complete our responsibilities 3 months early, 2 days early, and he requested the measuring devices four times. No one hurried up there. But we, on the other hand, fulfill the requests of the authorities...Why this? When they are asked — silence, when we are asked — an immediate hurrah and we forge ahead...Everything for the sake of reports and prizes...Who needs this kind of acceleration? It is the same thing as cars running around the city at a speed of 100 kilometers an hour—let them run over everyone as long as they can go faster...We promised to bring it up to full capacity immediately after the holidays. Two days early. Everyone is taking on added responsibilities...And what are we — sluggards?

Physicist: This is why the emergency protection was done away with."

V. Gubarev:

" 'Sarcophagus' contains three main ideas. The first is this. If a person acts against his conviction, against his point of view, if he moves away from responsibility, then this person is living in a sarcophagus.

"The second idea is this. If people — each individual and society as a whole — do not draw conclusions from tragedies then they are living in a sarcophagus.

"And the third idea is this. In the play there is constant repetition, like a refrain, of words from the instructions on civil defense as a model for atomic warfare. I wanted to say that if mankind does not take the lessons of the tragedy into consideration, it will be in a sacrophagus.

"This play was written in 1 week. It was in July — from 19 to 26 July. When I began writing it I could not sleep, I could not talk, I slept 3 hours a day. You see, I could not do otherwise. You see, now I judge all people, no matter where they live, no matter what they are involved in, no matter what posts they occupy, by their attitude toward Chernobyl. If the person is indifferent, if this tragedy did not touch him, this kind of person, to my thinking, is lost. Because there are such national tragedies, and this is a national tragedy, in which each person must express his attitude toward the events. I want to look into the eyes of those people who say that a play is not needed, that it is premature. Because if we do not sound the alarm, do not scream, do not warn, then there will be no one to look at our plays and our literary works, to read them."

From the play, "Sarcophagus:"

"*Physicist:* The main thing in this tragedy is its lessons. We do not have the right not to learn them...There has never yet been such an experience in the history of man. The explosion of a reactor and its consequences. It may be that this will be the only case. More likely it is the first. It should be the last. To do this we must study all aspects — scientific, technical, psychological."

V. Gubayev:

"And most importantly, these lessons should not bypass our youth. After all, those who were born after 1961, after the flight of Yuriy Gagarin, they truly do believe that they were born in the atomic age. They are used to the start-up of rockets. But they must understand one thing —since they live in such an era the level of their

knowledge and education must be considerably higher than that of their fathers. Because they will be working with generally new technology. And tomorrow they will be developing it. Sometimes they see this as their due, as some sort of given. Just like the car in the street. Or like the television. But this is complicated technology. And it is very dangerous. It demands from man a new level of conceptualization and knowledge, and most importantly — a new level in man's attitude toward it."

Robert Gale:

"There are many lessons in Chernobyl. One of them is the necessity to learn to exist with nuclear energy. We have no other choice. We are living in a nuclear age and must get on well with it. In the U.S.A. we receive almost 17 percent of our electrical energy from atomic power plants. In some countries of Western Europe this figure reaches 60 or 65 percent. By 1990 there will be about 500 nuclear reactors on earth. In other words, the question is not whether to enter or not to enter the nuclear age. We are already in it. For this reason a high level of responsibility, precision and care in the use of atomic energy are necessary. If we analyze the reasons for all accidents that have taken place in the U.S.A. and the USSR we will see that they occurred not as a result of atomic energy itself but due to human error.

"Another lesson to be drawn is that accidents similar to the one at Chernobyl touch not only the country in which it occurred but a number of neighboring countries as well. For this reason aid during such an accident should be carried out not just on a national, but also on an international level. We must understand that we depend on each other, especially since atomic energy and nuclear weapons are proliferating.

"Finally, the last and probably most important lesson. In comparison with the conscious use of atomic weapons Chernobyl could be categorized as an insignificant incident. But if this relatively small accident cost valuable human lives, the serious joint efforts of doctors and 2 billion rubles, then what can we say about the military use of nuclear weapons? We doctors will have no power to help man.

"This should never be forgotten.

"Chernobyl is the last warning for mankind."

On a cold November morning when a wet snow was falling on the clay ground I went to Mitino Cemetery in suburban Moscow. Not far from the entrance, to the left of the main walkway, there were neat rows of identical graves. White marble headstones. The dates of birth were different, but the dates of death were almost all May 1986.

The heroes of Chernobyl. The victims of Chernobyl. It is possible that among them were also the guilty of Chernobyl. Death has made them all equal, giving us the living the right to have only one feeling —immeasureable grief about the waste of these young human lives.

I paid my respects to their remains (in doing this I had to show the police guard my writer's identification, as if in my action there was something suspicious) and left with heavy thoughts about the time that we have lived through since Chernobyl. With its merciless x-rays the accident immediately illuminated our national and state mechanism. On the severe screen of Chernobyl our enormous internal power and reserves (after all, we can solve any problem if we set our mind to it!) as well as our serious chronic disease, which we cannot stash away into a placid formula of past years such as "individual atypical shortcomings," were revealed more clearly than ever before.

Doctor Gale was right! Chernobyl crashed out at us as a last warning—to mankind, to the country and to each one of us, young or old, whether we are in a position of leadership or a subordinate, whether we are scientist or worker.

To everyone.

The last warning.

I do not want to comment upon anyone else, I do not want to prove, elucidate, convince, scream or warn, because others are screaming and warning, the different people who do not know each other—Russians, Ukrainians, Belorussians, Georgians, Poles, Americans; and the golden-haired delicate Aneliya Perkovskaya, who, having sent the children of Pripyat to the pioneer camps, on 11 May collapsed unconscious and was sent to the hospital in serious condition; and Leonid Petrovich Telyatnikov with whom I had the opportunity to talk in a Kiev hospital and who at that time was already feeling better and whose head was covered with attractive, short dark auburn hair, but he admitted that he still slept poorly at night and the he is pursued by visions of the fire; and the "United States 1986 Man of the Year" — the brilliant doctor, Robert Gale, who has touched our lives and our misfortune; and the future cardiologist Maksim Drach, who matured many years in May 1986; and academician Valeriy Alekseyevich Legasov, who uttered such bitter and merciless words about the moral reasons for all our misfortunes.

They all said everything there is to say and their words need no extensive commentary.

And if their voices, their truths, will not be heard, if everyone remains as of old, if we study "a little, somehow," if we continue to work as we have worked, with our sleeves down, doing hack work, if loyal, cynical and illiterate persons anxious to please and not intelligent,

decent people with their independent views and convictions make careers in our society, if only unquestioning subordination to orders and not a creative juxtaposition of different, freely-expressed opinions are the highest valor at different hierarchical steps of the government, as before — then this will mean that we have not learned anything and that the lessons of Chernobyl have been in vain.

And then new Chernobyls will follow, new "Admiral Nakhimovs," new bitter shocks in our lives.

The warning of Chernobyl. It happened that I watched the television movie, "Warning," shown in February 1987 on TsT [color television], in one of the Kiev hospitals together with those who had worked in the Zone and were now under observation. All of the departments gathered at the television set, and although these were different people who did not know each other, on that evening the television screen and the difficult memories of what they had lived through united them all. To my mind came memories of childhood — in a cold movie theater in 1942 in Saratov a hungry and tired people watched the documentary film, "The Destruction of the German Fascist Troops Near Moscow." I watched with pain and hope, sorrow and faith.

The times have changed, the historical circumstances have changed and people have changed — only the expression on faces has remained the same — the same pain and hope. Sitting next to me were young fellows in hospital gowns — operators of Ukrainian television Yuriy Kolyada, Sergey Losev and Mikhail Lebedev, producer Igor Kobrin and commentator Gennadiy Dusheyko. They were intensively scrutinizing the close-ups of the chronicle of Chernobyl events. They know better than most at what price these close-ups were made. Yura Kolyada was the first television operator in the world to photograph the destruction of the reactor in May 1986. Each step nearer to the reactor "cost" dozens of x-rays in those days. The people around me knew the price of Chernobyl. In UkSSR Gosteleradio [State Radio and Television Association] alone, over fifty workers — television operators, radio journalists, commentators, sound technicians and drivers — had to undergo medical tests, and some had to go to sanatoriums for treatment. One of the leading and most fearless operators of the Ukrainian television, 49-year old Valentin Yurchenko, died suddenly in the fall of 1986. And although the cause of death (heart attack) outwardly was not related to Chernobyl radiation, who can reject the role of stress and the nervous overload borne by this courageous man during the hot summer days of 1986? This was the price at which the truth about Chernobyl was sought, the truth which in and of itself has become a serious warning to all of us.

Chernobyl began a special accounting of time for mankind.

Chernobyl's warning as a fully realistic image of what mankind can expect in case of a nuclear accident must be heard not only by professional politicians of the entire world and by the military with their fingers on missile buttons but also by every individual without exception regardless of age and the social situation.

"The avoidance of nuclear omnicide is the most urgent task of mankind in our day. However, for the great majority of people all of this is insufficiently clear. In other words, many of those who say they realize the danger actually do not believe in its reality." (Kvasil, B., Fuks, G., Rzhiman, Yy., Somervil, Dzh., Gayko, V. "The Scientists Talk: Nuclear Omnicide — Threat to All Living Things," in book: "Who and How Peace Can Prevail," Prague, Mir i Sotsializm, 1981).

I would like to believe that after Chernobyl mankind will understand more clearly what can happen to it if we begin an exchange of nuclear strikes.

...In empty Pripyat we entered the central point for city security. The police officer on duty was sitting at the signal control panel. In the next room the patrol director was chewing out a sergeant for something. Bundles of keys were hanging on a plywood board before the guard. There were street names and a yellow bunch of front-door keys to houses on the board. By the number of keys it was possible to understand where there were more houses and where fewer.

I would not like to see, at the Martian earth security station (militia or police, it does not matter), bunches of keys belonging to countries that have fallen and been abandoned forever. I do not want to see the glitter of a key from my homeland, the Ukraine, somewhere in the general bundle of keys belonging to Europe.

In my garage I have hanging as a symbol of that wild world which we entered last year the white overalls given to me in Chernobyl. Really I should probably throw them out since I walked around in them in the Zone, but I cannot — it is valuable as a memory and ominous as a warning. And in the evenings when I come home and drive into my garage, lights on, the blinding white apparition appears before me — an apparition that now wanders through Chernobyl fields and Kiev apartments...

Enough about this!

This is why I want to finish my story with one idyllic memory. After everything that I had seen in the Zone and around it, after the deathly silence of the abandoned villages (I do not know why, but I was especially touched by the village cemeteries, these "shadows of forgotten ancestors," where the living will no longer be coming), after the hospital wards and the looks of those lying under the medicine droppers, after the jumping of the arrows of the dosimeters, after the danger hidden in the

grass, water and trees, I left Kiev for 2 days in May. I sped to the east on the empty Kiev-Kharkov highway and stopped only at check points in order to undergo dosimetric control.

I was driving to Mirgorod to see my daughter and granddaughter. The very same Mirgorod about which Nikolay Vasilyevich Gogol had written:

"Mirgorod is a wonderful city! It has all types of structures! The roofs are straw, or bog-rush or even wooden; to the right is a street, to the left is a street, everywhere there is magnificent wattle fencing; the hop plant weaves upon this fencing, pots are hung on it, from behind it sunflowers show their sunlike heads, poppies redden, and fat melons can be glimpsed fleetingly...Abundance!"

How long ago that was! From what kind of naive and serene time did these words come! But in May 1986 the city of Mirgorod was also magnificent. It was magnificent in that it had no radiation, or maybe the radiation there was just slightly elevated. And no one here recommended that windows be closed.

It was a May dusk, when the air in Mirgorod is filled with the lazy aromas of the land that has grown languid in the course of the day. I went to the bank of the small Khorol River, lay down in the grass and closed my eyes. Nearby I heard the love trills of frogs, felt the freshness of the grass and the nearness of the water. On the other bank cows were mooing, waiting for the time when they could give their hot milk to the tin pails. And suddenly I understood what happiness is.

It is grass on which you can lie down without fearing radiation. It is a warm river in which you can swim. It is cows whose milk you can drink freely. It is the provincial town living a measured life, and the sanatorium with its tree-lined paths along which the vacationers stroll, buy tickets for the summer movie theater and make friends — this is happiness. But not everyone understands this.

I felt that I was an astronaut who had returned to earth from a long and dangerous journey into the anti-world.

At that moment one of my friends called me and handed me some kind of plant that she had pulled out by the roots. Nothing special — coarse, dark-green leaves and a thick stalk as if colored with violet inks. This plant was called the "Chernobyl." Bitter was its aftertaste.

December 1986-January 1987

(End of the first book.)

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